# MBPA DEIS Chapter 4 Table of Contents

## Figures - Attachment 1

# 4.0 ENVIRONMENTAL CONSEQUENCES

## 4.1 INTRODUCTION

This chapter presents a discussion of the environmental impacts associated with the Proposed Action and alternatives presented in **Chapter 2.0**. Analysis of environmental impacts in this chapter is confined to that associated with new disturbances for each alternative. The four alternatives analyzed in this section include the following:

- **Alternative A - Proposed Action** would include the development of up to 3,250 Green River oil wells and 2,500 vertical deep gas wells along with associated access roads, water-supply pipelines, gathering lines, compressor stations, water treatment facilities, GOSPs, and gas processing plant.
- **Alternative B - No Action Alternative** analyzes the effects of taking no action to implement the Proposed Action or other action alternatives. This alternative assumes that the development of oil and gas resources would continue on projects previously approved by BLM and would likely continue on State of Utah and private lands or minerals, subject to the approval of UDOGM or the appropriate private landowner or mineral rights owner. For purposes of analysis in this EIS, it is assumed that under the No Action Alternative, approximately 788 new wells and associated facilities will be completed.
- **Alternative C - Field-Wide Electrification Alternative** was developed in response to issues raised during the public and agency scoping process. The principal component of this alternative entails a phased field-wide electrification system that would be integrated in the MBPA over an estimated 7-year period. This alternative analyzes the impact of development of up to 3,250 Green River oil wells and 2,500 vertical deep gas wells and associated infrastructure and is virtually identical to the Proposed Action, except that gas-driven motors would be converted to electric motors as field-wide electrification is phased into the MBPA.
- **Alternative D - Resource Protection Alternative** is the agency preferred alternative, which was developed in response to comments received during the agency and public scoping period. It was designed to minimize the amount of new surface disturbance within the Pariette Wetlands ACEC, Level 1 and 2 Core Conservation Areas for *Sclerocactus* species, and other portions of the MBPA through the use of directional drilling technology on new and existing multi-well pads. Alternative D analyzes the impact of drilling up to 3,519 Green River oil wells and 1,539 deep gas wells.

Each of the alternatives is discussed based on alternative-specific activities, schedule, design features, and surface disturbance. It is notable that the proposed surface locations for well pads, pipeline corridors, utility corridors, access roads, and other surface facilities are conceptual at this point. These locations have been illustrated on the alternative-specific maps (**Figures 2-1** through **2-4 – Attachment 1**) for analytical and impact evaluation purposes only in this EIS. Actual locations for well pads, access roads, ROWs, and other surface facilities would be determined at the project implementation phase.

This EIS provides a large-scale or "big-picture" level of analysis in that the proposed surface locations for well pads, pipeline corridors, utility corridors, access roads, and other surface facilities are conceptual at this point. Because of the programmatic nature of this document, analysis requires that well locations be estimated based on existing foreseeable development scenarios. Surface disturbance calculations in this chapter are based on the alternative-specific conceptual development and disturbance calculations

disclosed in Chapter 2. Potential disturbance from cross-country pipelines is not reflected in the resource-specific analyses in this chapter as it was not feasible to map them conceptually. Therefore, resource-specific GIS calculations are not available. Once this project is implemented, individual well siting and associated effects would be determined through site-specific clearances associated with the APD process. These clearances would include site-specific biological, cultural, and paleontological surveys prior to construction, as directed by the BLM (see **Section 2.1**, *Management Actions Common to All Action Alternatives*). All required mitigation measures would be identified at that time. Impact analyses are written assuming that all proposed mitigation measures will be carried forward as COAs in the ROD for this project.

## 4.1.2 Types of Impacts to be Addressed

Impacts are defined as modifications to the existing environment brought about by implementing an alternative. Impacts can be beneficial or adverse, result from the action directly or indirectly, and can be long-term, short-term, temporary, or cumulative in nature. This analysis provides a quantitative or qualitative comparison (dependent on available data and nature of the impact) between alternative impacts as well as establishes the severity of those impacts in the context of the existing environment. It also includes specifically required disclosures under NEPA, including the irreversible (resource use or environment cannot be restored) and irretrievable (resource value is lost until the environment is restored) commitment of resources and the impact of the Project's short-term resource use and the long-term productivity of the MBPA.

Direct impacts are attributable to implementation of an alternative that affects a specific resource, and generally occur at the same time and place. Indirect impacts can result from one resource affecting another (e.g., soil erosion and sedimentation affecting water quality) or can occur later in time or removed in location, but are still reasonably foreseeable. Long-term impacts are those that would substantially remain for many years or for the LOP. Temporary impacts are short-term or ephemeral changes to the environment that return to the original condition once the activity is stopped, such as air pollutant emissions caused by earthmoving equipment during construction. Short-term impacts result in changes to the environment that are stabilized or mitigated rapidly and without long-term impacts. Cumulative impacts are the result of past, present, and reasonably foreseeable future actions by federal, state, and local governments, private individuals, and entities in or near the MBPA.

### 4.1.2.1 Unavoidable Adverse Impacts

Unavoidable adverse impacts are discussed in this section and throughout the chapter for each resource. These impacts are the effects on natural and human resources that would remain after mitigation measures have been applied. Mitigation measures may consist of existing regulatory requirements or other potential mitigation (including measures outside the jurisdiction of the lead or cooperating agency). This section of the EIS indicates the effectiveness of proposed mitigation measures for each resource and helps the decision maker identify those mitigation measures to be included in a ROD.

### 4.1.2.2 Irretrievable and Irreversible Commitment of Resources

Irreversible and irretrievable commitments of resources (in other words, irreversible and irretrievable impacts) are disclosed in this section and throughout the chapter for each resource. An irreversible or irretrievable commitment of resources refers to impacts on or losses to resources that cannot be recovered or reversed. Examples include permanent conversion of wetlands, or loss of cultural resources, soils, wildlife, and socioeconomic conditions. The losses are permanent. Irreversible is a term that describes the

loss of future options. It applies primarily to the effects of use of nonrenewable resources, such as minerals or cultural resources, or to those factors, such as soil productivity, that are renewable only over long periods of time. Irretrievable is a term that applies to the loss of production or use of natural resources. For example, some of the wildlife habitat in the MBPA is lost irretrievably while the wells are in production. The production lost is irretrievable, but the action is not irreversible.

#### 4.1.2.3 Relationship of Short-Term Uses to Long-Term Productivity

The relationship of how short-term project use would affect long-term productivity is described in this section and throughout the chapter for each resource.

## 4.2 AIR QUALITY

This air quality environmental impact assessment is supported by the AQTSD contained in **Appendix B**. The AQTSD presents the detailed emission inventories and associated air quality impact assessment (AQIA). The AQIA was conducted in four major steps:

- Develop evaluation criteria
- Develop emissions inventories
- Evaluate the potential impact of emissions through the use of nearfield and farfield dispersion models, AERMOD, and CALPUFF
- Compare the impacts to the evaluation criteria

The evaluation criteria and methodology for determining the pre-project (background) air quality were discussed in **Section 3.2**.

Emission inventories were completed for the Proposed Action and alternatives. The key variables used in preparing the emission inventories include the following:

- Number of oil and gas wells drilled and developed (as specified for each alternative)
- Nature of construction activities associated with well sites (e.g., construction activities such as bulldozing, duration of each activity, road and pipeline construction, etc.)
- Production rate of the oil and gas wells
- Nature of the oil and gas produced (e.g., expected gas to oil ratios and gas and oil composition)
- Types and sizes of equipment used at each well site to produce the oil and gas (e.g., 0.5 MMBtu/hr (million btu per hour) heaters at each oil well)
- Nature of operational activities at each well site (e.g., storage tanks on site and pumper truck emissions associated with oil transport)
- Infrastructure for each Alternative (e.g., number and size of compressor stations and gas oil separator plants)
- ACEPMs that will be used under the Alternatives to reduce emissions (discussed in **Section 2.2.12.1**)

- Regulatory programs that require emission reductions

Details for how the emission inventories were prepared are found in the AQTSD, and the equations and parameter values used to calculate the inventories are detailed in the appendices to the AQTSD. Four sets of emission inventories were prepared (one for each alternative). In addition, a set of annual development inventories was prepared to evaluate the potential for an increase in emissions from the Proposed Action over the No Action Alternative as discussed in **Sections 4.2.1.1.1** and **4.2.1.1.5**.

The impact assessment methodology is discussed in detail in the AQTSD. The methodology used local meteorological data obtained at Vernal, Utah, and background air quality data for the region (discussed in **Appendix B, Section 3.2**) coupled with EPA and UDAQ-approved dispersion models (AERMOD and CALPUFF) to assess the impacts of the emissions. Two sets of impact models were run, one for Alternative A and the other for Alternative C. Alternative C was evaluated with dispersion models because it adds electrical generating stations that could have different impacts from Alternative A. Alternatives B and D will have lower emissions and thus the impacts will be lower than for Alternative A or C. The impact models assessed the near-field (less than 50 km) and far-field (e.g., distant Class I and sensitive Class II areas) impacts of criteria pollutant emissions and near-field impacts of hazardous air pollutants. The impact models were run for both 20-acre downhole spacing and 40-acre downhole spacing scenarios for oil and gas wells. The modeling scenarios used a maximum impact combination of activities in close proximity (e.g., producing oil and gas wells near operating compressor stations near new well drilling and development). The scenarios are described in the AQTSD.

As discussed in **Section 4.2.1.1.5**, no project-specific ozone impact modeling has been conducted because the tools needed for such modeling are not yet available; however, the Greater Natural Buttes Final Environmental Impact Statement analyzed the potential for ozone formation in the Uinta Basin and, as discussed in **Section 4.2.1.1.5**, that analysis included the Newfield project. In addition, for the first few years of the project, as shown in the following sections, emission increases under any of the Action Alternatives will be less than the No Action Alternative. Nevertheless, because any of the Action Alternatives will eventually result in ozone precursor emissions greater than the No Action Alternative, BLM will implement an Adaptive Management Strategy to mitigate the potential for adverse ozone formation (see **Section 4.2.1.1.6**). The Adaptive Management Strategy for potential adverse ozone formation is also discussed in **Section 2.2.11**.

The following sections discuss the air quality impact assessment methodology and results.

## 4.2.1 Direct and Indirect Effects

### 4.2.1.1 Alternative A - Proposed Action

Pollutant emissions have the potential to affect air quality on both a local and a regional scale. Emission inventories for the criteria pollutants $NO_X$, CO, $SO_2$, $PM_{10}$, $PM_{2.5}$, HAPs, VOCs were calculated for the development, operation, and infrastructure related activities for Alternative A, as shown in the AQTSD (see **Appendix B**). The emission inventories were then used as input to dispersion models to assess the potential impacts of Alternative A, as reported in the AQTSD.

#### 4.2.1.1.1 Emissions

Emissions occur during two primary phases of the Proposed Action: the construction and development phase and the operations phase. The construction and development phase includes emissions from the following activities:

- Construction
- Drilling
- Completion
- Interim reclamation
- Wind erosion

The operations or production phase includes emissions from:

- Pump unit engines
- Production heaters
- Well site tanks
- Pneumatics
- Fugitive emissions of VOCs
- Well site truck loading emissions
- Well site flares
- Operations vehicle fugitive dust and tailpipe emissions

In addition to the development and the operations phases, infrastructure must be built to serve the operating wells. Infrastructure emissions include emissions from the following:

- Water treatment facility oil tanks, fugitive emissions of VOCs and emissions from gas generators
- GOSPs, including truck loading emissions
- Compressor station emissions, including engines, tanks, dehydrators, flares and fugitives
- Gas processing plant emissions, including dehydrators, compressor engines and fugitives

**Table 4.2.1.1.1-1** summarizes the annual emissions associated with various phases and activities proposed in Alternative A. The summaries come from the AQTSD. The individual HAPs shown in the tables are those that are most meaningful based on largest emission quantities coupled with the lowest thresholds for potential adverse health effects discussed in **Appendix B, Section 3.2**, specifically benzene, toluene, xylene, n-hexane, formaldehyde, and acrolein. Ethylbenzene is also associated with oil and gas development, but ethylbenzene emissions are very small compared to the other HAPs listed in **Table 4.2.1.1.1-1**. Ethylbenzene emissions are quantified and reported in the appendices to the AQTSD. Emissions for each of the activities within the three primary phases (e.g., pumpjack engines, well site

heaters, stock tanks, etc.) are detailed in the appendices to the AQTSD. GHG emissions include emissions of natural gas that could occur during well drilling and completion.

The emissions shown in **Table 4.2.1.1.1-1** include the benefit of the ACEPMs and regulatory requirements under the recently promulgated (August 16, 2012) New Source Performance Standard for oil and gas operations (Oil and Gas NSPS) published as 40 CFR 60 Subpart OOOO. The emissions do not include the benefit of emission reductions that may be required under the State of Utah permitting guidance State or Federal Implementation Plans (SIP or FIP) for the Uinta Basin, and the tribal New Source Review (NSR) programs that will be promulgated in the near future (late 2013 or 2014). These programs will likely require additional emission reduction measures for the Proposed Action. The emissions also do not include emission reductions that could occur under the Adaptive Management Strategy to mitigate potential ozone formation (see **Section 4.2.1.1.6**).

The benefit of the emission reductions required by the Oil and Gas NSPS and the ACEPMs are shown in **Table 4.2.1.1.1-2**. Details as to how the benefits were calculated are shown in the AQTSD, Section 6.

The emissions in **Table 4.2.1.1.1-1** represent the emissions that could occur in a maximum emissions year if the Proposed Action is fully developed. The maximum emissions year assumes that all of the proposed wells (5,750 wells) have been drilled and are operating during that year normal drilling operations (approximately 360 wells per year) are conducted. This is a conservatively high combination of emissions and is not likely to occur. In addition, it will require at least 16 years to reach the full development and maximum emissions assumed for **Table 4.2.1.1.1-1** (5,750 wells divided by 360 wells per year equals approximately 16 years). Accordingly, emission increases for the MBPA have also been estimated on an annual development basis.

Annual development emissions for NOx and VOC from the Proposed Action were estimated on an annual basis for calendar years 2012 through 2022. The annual development emissions are shown in **Table 4.2.1.1.1-3**. Only NOx and VOC emissions were estimated on an annual basis because they are the pollutants thought responsible for ozone formation in the Uinta Basin. The annual development emissions for 2012 through 2022 provide a 10-year view of how emissions will increase as the Proposed Action is developed. As indicated, it will require at least 16 years to reach full development of the Proposed Action.

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## Table 4.2.1.1.1-1. Proposed Action Ultimate Development Emissions

| Pollutant | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Total Emissions (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| ***Criteria Pollutants*** | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$NO_x$** | 129.6 | 1,809.7 | 981.0 | 2,920.2 | 668.6 | 511.1 | 1,590.2 | 2,769.9 | 5,690.1 |
| **CO** | 106.0 | 2,290.7 | 1,782.8 | 4,179.6 | 594.3 | 523.1 | 3,226.8 | 4,344.2 | 8,523.8 |
| **VOC** | 12.1 | 3,929.0 | 1,109.2 | 5,050.3 | 35.9 | 3,795.8 | 1,479.0 | 5,310.6 | 10,360.9 |
| **$SO_2$** | 0.2 | 3.9 | 2.8 | 6.9 | 1.2 | 2.9 | 3.4 | 7.5 | 14.4 |
| **$PM_{10}$** | 423.3 | 570.3 | 393.2 | 1,386.7 | 1,145.1 | 283.0 | 88.8 | 1,516.9 | 2,903.6 |
| **$PM_{2.5}$** | 46.0 | 224.1 | 95.6 | 365.8 | 128.4 | 61.8 | 60.9 | 251.2 | 617.0 |
| ***HAPs*** | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **Benzene** | 0.084 | 16.25 | 5.61 | 21.95 | 0.52 | 26.15 | 13.95 | 40.62 | 62.57 |
| **Toluene** | 0.031 | 12.01 | 3.93 | 15.98 | 0.19 | 48.84 | 10.89 | 59.92 | 75.90 |
| **Xylene** | 0.020 | 3.63 | 1.08 | 4.73 | 0.13 | 37.30 | 2.51 | 39.94 | 44.67 |
| **Formal-dehyde** | 0.0080 | 182.68 | 49.38 | 232.07 | 0.053 | 0.36 | 148.50 | 148.92 | 380.99 |
| **Acrolein** | 0.00080 | 25.71 | 5.40 | 31.12 | 0.0053 | --- | 14.47 | 14.48 | 45.60 |
| **Total HAPs** | 0.26 | 446.77 | 107.16 | 554.19 | 1.05 | 211.21 | 238.28 | 450.54 | 1,004.73 |
| ***GHGs and Global Warming Potential*** | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$CO_2$** | 18,776 | 780,830 | 597,890 | 1,397,495 | 116,923 | 602,127 | 714,145 | 1,433,195 | 2,830,690 |
| **$CH_4$** | 18.81 | 3,816 | 668 | 4,502 | 4.60 | 7,152 | 928 | 8,085 | 12,587 |
| **$N_2O$** | 0.15 | 1.47 | 1.11 | 2.73 | 0.93 | 1.13 | 1.34 | 3.40 | 6.13 |
| **GWP** | 19,218 | 861,421 | 612,256 | 1,492,895 | 117,308 | 752,679 | 734,054 | 1,604,041 | 3,096,936 |

**Table 4.2.1.1.1-2. Benefit of ACEPMs for $NO_x$ and VOC Emissions for the Ultimate Proposed Action**

| Key NOx and VOC ACEPM | NOx without ACEPM (tpy) | NOx with ACEPM (tpy) | ACEPM NOx Benefit (tpy) | Percent NOx Reduction | VOC without ACEPM (tpy) | VOC with ACEPM (tpy) | ACEPM VOC Benefit (tpy) | Percent VOC Reduction |
|---|---|---|---|---|---|---|---|---|
| Pumpjack Engines | 2,836 | 1,465 | -1,371 | 48% | 827 | 397 | -430 | 52% |
| Tank Controls (GOSP, centralization, and/or flares) | 0 | 1.7 (from flares) | +1.7 | N/A | 8,304 | 3,488 | -4,816 | 58% |
| Tier 4 Drill Rig Engines | 1,132 | 613 | -519 | 46% | 236 | 33 | -203 | 86% |
| Dehydrator Still Vent Emission Control | 0 | 20 (from flares) | +20 | N/A | 946 | 47 | -899 | 95% |
| Shut-in Wells or Convert Wells to Waterflood Injection | 1,256 | 0 | -1,256 | 100% | 1,868 | 0 | -1,868 | 100% |
| **Total** | **5,224** | **2,100** | **-3,124** | **60%** | **12,181** | **3,965** | **-8,216** | **67%** |

Note: The ACEPM benefits compared to no ACEPM in this table were calculated as follows and as explained in detail in Section 6 of Appendix B:

- 3,250 new pumpjack engines (100 percent) compared to 31 percent new without the ACEPM.
- 1,800 tanks controlled by GOSPs or VRU/smokeless combustors plus an additional 724 wells sharing 2 tanks per 2 wells and are controlled compared to no tank control.
- 360 drill rigs (204 oil wells and 156 gas wells) drilled with Tier 4 engines compared to all drilled with Tier 2 engines
- 2,500 well-site dehydrators controlled 95 percent at gas well sites compared to no control at the well site. Dehydrators at compressor stations are controlled with or without ACEPMs.
- 950 low producing wells (2 barrels per day) converted to shut down compared to allowing low producing wells to continue operations.

**Table 4.2.1.1.1-3. Proposed Action Annual Development Emission Increases in the MBPA**

| Calendar Year | Cumulative Net Change in $NO_x$ from December 31, 2011 (tpy) | Cumulative Net Change in VOC from December 31, 2011 (tpy) | Cumulative Net Change in $NO_x$ plus VOC from December 31, 2011 (tpy) (2+3) | Cumulative Number of Oil Wells Added | Cumulative Number of Gas Wells Added | Cumulative Wells Shut In or Converted to Water Injection | Cumulative Net Change in Number of Oil and Gas Producing Wells from December 31, 2011 (5+6-7) |
|---|---|---|---|---|---|---|---|
| 2012 | -53 | 25 | -28 | 187 | 0 | 200 | -13 |
| 2013 | -172 | -603 | -775 | 363 | 0 | 400 | -37 |
| 2014 | -311 | -684 | -995 | 559 | 0 | 600 | -41 |
| 2015 | -387 | -545 | -932 | 794 | 0 | 800 | -6 |
| 2016 | -320 | -99 | -415 | 1,038 | 0 | 950 | 88 |
| 2017 | -149 | 580 | 431 | 1,281 | 0 | 950 | 331 |
| 2018 | -16 | 1,383 | 1,367 | 1,524 | 0 | 950 | 574 |
| 2019 | 194 | 2,213 | 2,407 | 1,767 | 12 | 950 | 829 |
| 2020 | 378 | 3,086 | 3,464 | 2,010 | 24 | 950 | 1,084 |
| 2021 | 561 | 3,959 | 4,520 | 2,253 | 36 | 950 | 1,339 |
| 2022 | 745 | 4,833 | 5,578 | 2,496 | 48 | 950 | 1,594 |

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#### 4.2.1.1.2 Potential Near-Field Criteria Pollutant Impacts Other than Ozone

To assess the potential air quality impact of the emissions associated with the Proposed Action, EPA-recommended dispersion models were used with meteorological data from Vernal, Utah, as described in the AQTSD Section 5. The criteria pollutant impacts were evaluated using a near-field model, AERMOD, and compared to ambient air quality standards. The criteria pollutants evaluated were $PM_{10}$, $PM_{2.5}$, $NO_2$, $SO_2$ and CO. The highest possibility of emissions for $PM_{10}$ and $PM_{2.5}$ takes place during the construction and development phase of the project. The highest possibility of emissions for NOx, CO, and $SO_2$ takes place during the operations and infrastructure phases of the project. Each pollutant was modeled under the maximum development and operational scenarios of the Proposed Action as discussed in the AQTSD (see **Appendix B**), which includes drilling during the maximum operation year (emissions shown in **Table 4.2.1.1.2-1**).

**Tables 4.2.1.1.2-1** and **4.2.1.1.2-2** present the maximum modeled impact of Alternative A added to the pre-project background concentrations presented in **Table 3.2.3.2-1**, and the sum is compared to the applicable NAAQS. The results shown in **Tables 4.2.1.1.2-1** and **4.2.1.1.2-2** are from the oil well modeling scenario because that scenario had greater impacts than the gas well modeling scenario except for 1-hour CO, which is from the gas well modeling scenario. Section 4.2.1.1.1 describes the emission sources that contribute to the impacts shown in the Tables. None of the modeled impacts for Alternative A exceed the NAAQS.

**Table 4.2.1.1.2-1. Alternative A Maximum Potential Construction and Development Impacts**

| Pollutant | Averaging Period | Ambient Air Concentration ($\mu g/m^3$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Year of Maximum Impact | Location of Maximum Impact | Modeled Impact | Background | Total | NAAQS |
| $PM_{10}$ | 24-hour | 2007 | 100 m west of pad construction | 72.5 | 18.7 | 91.2 | 150 |
| $PM_{2.5}$ | 24-hour | NA | 200 m SE of pad construction | 14.3 | 17.8 | 32.1 | 35 |
| | Annual | 2005 | 100 m east of producing wells | 1.4 | 8.0 | 9.4 | 12 |

**Table 4.2.1.1.2-2. Alternative A Maximum Potential Operations Impacts**

| Pollutant | Averaging Period | Ambient Air Concentration ($\mu g/m^3$) | | | | | |
|---|---|---|---|---|---|---|---|
| | | Year of Maximum Impact | Location of Maximum Impact | Modeled Impact | Background | Total | NAAQS |
| CO | 1-hour | 2007 | 100 m north of compressor station | 276 | 2,641 | 2,917 | 40,000 |
| | 8-hour | 2009 | 100 m east of GOSP | 137 | 1,657 | 1,794 | 10,000 |
| $NO_2$ | 1-hour | NA | 100 m east of producing wells | 106.9 [a] | 57.7 | 164.6 | 188 |
| | Annual | 2005 | 100 m east of producing wells | 16.5 | 7.3 | 23.8 | 100 |
| $SO_2$ | 1-hour | NA | 100 m east of GOSP | 0.7 | 20.1 | 20.8 | 196 |
| | 3-hour | 2006 | 100 m south of GOSP | 0.6 | 14.3 | 14.9 | 1,300 |

[a] Assumes Tier 2 NO to $NO_2$ conversion of 80 percent

### 4.2.1.1.3 Potential Hazardous Air Pollutant Impacts

The potential impact of emissions from acrolein, benzene, and formaldehyde were modeled. These three HAPs were selected due to their relatively high emission rates and relatively low RELs, (RfCs), and TSLs as discussed in **Section 3.2.2.3**. For non-carcinogenic effects, the modeled impacts for Alternative A were compared to the RELs, RfCs, and TSLs as shown in **Table 4.2.1.1.3-1** for operational impacts. HAP impacts were not modeled for the construction and development phase of the project because the emissions are so much smaller than during operations. None of the impacts are greater than the evaluation criteria. The modeled impacts shown in **Table 4.2.1.1.3-1** are the maximum impact from either the oil well modeling scenario or the gas well scenario, depending on which impact is greater.

**Table 4.2.1.1.3-1. Alternative A Operations HAPs Impacts and Development Phase**

| Pollutant and Averaging Time | Averaging Period | Maximum Impact Year | Modeled Maximum Impact ($\mu g/m^3$) | Relative Exposure Levels (µg/m3) | Reference Concentrations (µg/m3) | Toxic Screening Levels ($\mu g/m^3$) |
|---|---|---|---|---|---|---|
| Acrolein | Annual | 2006 | 0.18 | NA [a] | 0.35 | NA |
| | 1-hour | 2006 | 1.50 | 2.5 | NA | 23 |
| Benzene | Annual | 2005 | 0.30 | NA | 30 | NA |
| | 1-hour | 2005 | 5.55 | 1,300 | NA | 18 [b] |
| Formaldehyde | Annual | 2006 | 1.27 | NA | 9.8 | NA |
| | 1-hour | 2007 | 12.32 | 55 | NA | 37 |

[a] NA means that the criterion is not applicable for the averaging time noted, i.e., there is no value.
[b] The TSL for benzene is a 24-hour average, but the 1-hour concentration is conservatively compared to the TSL.

Potential carcinogenic effects are evaluated by calculating the probability of contracting cancer due to continuous exposure to carcinogenic HAPs. The carcinogenic HAPs of interest are formaldehyde and benzene. The results are shown in **Table 4.2.1.1.3-2** for Alternative A operational impacts. As discussed in the AQTSD, cancer risk is calculated for both the Maximum Likely Exposure (MLE) and the Maximum Exposed Individual (MEI). The MLE risk value is a more realistic, yet a very conservative over-estimate of potential cancer risk than the MEI risk value. MLE exposure is based on a 9-year exposure which is the average duration that a person resides at a single location. MEI is based on continuous exposure for the LOP. The MEI and MLE adjustment factors are further described in the AQTSD. Potential cancer risk is not calculated for construction and development impacts since the potential HAPs emissions of carcinogenic HAPs are much less than for operational impacts.

**Table 4.2.1.1.3-2. Alternative A Operational Potential Carcinogenic Risk**

| Exposure Scenario | HAP | Unit Risk Factor ($1/\mu g/m^3$) | Exposure Adjustment Factor | Modeled Annual Impact ($\mu g/m^3$) | Cancer Risk |
|---|---|---|---|---|---|
| MLE | Benzene | $2.2 \times 10^{-06}$ to $7.8 \times 10^{-06}$ | 0.095 | 0.30 | $6.2 \times 10^{-08}$ to $2.2 \times 10^{-07}$ |
| | Formaldehyde | $1.3 \times 10^{-05}$ | 0.095 | 1.27 | $1.6 \times 10^{-06}$ |
| | | | | **Total MLE Risk** | **$1.8 \times 10^{-06}$** |
| MEI | Benzene | $2.2 \times 10^{-06}$ to $7.8 \times 10^{-06}$ | 0.571 | 0.30 | $3.8 \times 10^{-07}$ to $1.3 \times 10^{-06}$ |
| | Formaldehyde | $1.3 \times 10^{-05}$ | 0.571 | 1.27 | $9.4 \times 10^{-06}$ |
| | | | | **Total MEI Risk** | **$1.1 \times 10^{-05}$** |

The maximum likely exposure impact reported in Table 4.2.1.1.3-2 is a potential carcinogenic risk of 1.8 in a million. This value is an over-estimate and not likely to occur as it assumes that a person is exposed outside continuously for 9 years at a location immediately adjacent to a worst-case set of emitting devices

operating continuously at maximum production. Therefore, the potential risk is less than the acceptable range of risk published by the EPA of 1 to 100 in a million (USEPA 1993).

#### 4.2.1.1.4 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Potential impacts of the Proposed Action on Prevention of Significant Deterioration (PSD) increments, visual air quality, and air quality related values (AQRV) were assessed with the far-field model, CALPUFF. Visual air quality and acid deposition were assessed at 13 Class I areas and 9 sensitive Class II areas. In addition, potential changes to acid neutralization capacity (ANC) at 21 sensitive lakes located in western Colorado were assessed. The Class I areas, sensitive Class II areas, and sensitive lakes evaluated are shown in the AQTSD. Generally, potential impacts on AQRVs are of concern only when examining cumulative impacts of the Proposed Action plus other activities in the region. Nevertheless, the potential impacts of the Proposed Action alone were evaluated as reported in the AQTSD.

Potential impacts with respect to PSD increments at the Class I and sensitive Class II areas are shown for the five closest Class I and sensitive Class II areas to the MBPA in **Table 4.2.1.1.4-1**. The 0.5 and 1.0 dV change analysis thresholds were exceeded at the closest sensitive Class II area. There was one day at the nearest Class I area where the maximum dV change was greater than 1.0, but the 98$^{th}$ percentile was less than 1.0. Note that the modeled impacts are for full production of the entire project plus maximum drilling frequency. This scenario will not likely occur. In addition, the ACEPMs discussed in Section 2.2.12 and the adaptive management strategy to mitigate potential ozone formation discussed in Section 2.2.11 will reduce the potential regional haze impacts because those measures will reduce NOx and VOC emissions specifically and likely reduce other pollutants as well.

**Table 4.2.1.1.4-1. Alternative A Maximum Impacts at Closest Class I and Sensitive Class II Areas Compared to PSD Increments**

| Class I and Sensitive Class II Areas | $NO_2$ Annual ($\mu g/m^3$) | $PM_{10}$ Annual ($\mu g/m^3$) | $PM_{10}$ 24-hr ($\mu g/m^3$) | $PM_{2.5}$ Annual ($\mu g/m^3$) | $PM_{2.5}$ 24-hr ($\mu g/m^3$) | $SO_2$ 3-hr ($\mu g/m^3$) | $SO_2$ 24-hr ($\mu g/m^3$) | $SO_2$ Annual ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|---|
| **PSD Class I Increments** | **2.5** | **4** | **8** | **2** | **1** | **25** | **5** | **2** |
| **NPS Class I Areas** | | | | | | | | |
| Arches National Park | 0.0016 | 0.022 | 0.513 | 0.0047 | 0.110 | 0.005 | 0.0008 | 0.00003 |
| **NPS Class II Areas** | | | | | | | | |
| Dinosaur National Monument | 0.0491 | 0.2334 | 4.55 | 0.0496 | 0.966 | 0.1053 | 0.0135 | 0.0005 |
| **U.S. Forest Service (USFS) Class II Areas** | | | | | | | | |
| Flaming Gorge National Recreation Area | 0.0029 | 0.067 | 0.549 | 0.0142 | 0.117 | 0.011 | 0.0014 | 0.00011 |
| High Uintas Wilderness Area | 0.0058 | 0.0913 | 0.779 | 0.0194 | 0.1655 | 0.021 | 0.0028 | 0.00016 |
| **USFWS Class II Areas** | | | | | | | | |
| Browns Park National Wildlife | 0.0046 | 0.0614 | 0.583 | 0.0130 | 0.1236 | 0.0130 | 0.0017 | 0.00011 |

| Class I and Sensitive Class II Areas | $NO_2$ Annual ($\mu g/m^3$) | $PM_{10}$ Annual ($\mu g/m^3$) | $PM_{10}$ 24-hr ($\mu g/m^3$) | $PM_{2.5}$ Annual ($\mu g/m^3$) | $PM_{2.5}$ 24-hr ($\mu g/m^3$) | $SO_2$ 3-hr ($\mu g/m^3$) | $SO_2$ 24-hr ($\mu g/m^3$) | $SO_2$ Annual ($\mu g/m^3$) |
|---|---|---|---|---|---|---|---|---|
| Refuge | | | | | | | | |
| **PSD Class II Increments** | **25** | **17** | **30** | **9** | **4** | **512** | **91** | **20** |

Potential visual air quality impacts were assessed by comparing changes in regional haze calculated with the CALPUFF post processor Method 8 and the revised IMPROVE equation for calculating light extinction (FLAG 2010). The change in light extinction, in terms of deciview (dV), was compared to the 0.5 dV and 1.0 dV change levels of concern thresholds promulgated by the Federal Land Managers. In addition, the 98$^{th}$ percentile (8$^{th}$-high) maximum change in light extinction was calculated and reported. The visual air quality impacts for all of the Class I and sensitive Class II areas were evaluated, with the five closest areas shown in **Table 4.2.1.1.4-2.**

**Table 4.2.1.1.4-2. Alternative A Regional Haze Impacts at Closest Class I and Sensitive Class II Areas**

| Class I and Sensitive Class II Areas | Number of Days > 0.5 dV Change | Number of Days >1.0 dV Change | Max Change in $b_{ext}$ (dV) | Eighth-High Change in $b_{ext}$ (dV) |
|---|---|---|---|---|
| **NPS Class I Areas** | | | | |
| Arches National Park | 17 | 1 | 2.01 | 0.75 |
| **NPS Class II Areas** | | | | |
| Dinosaur National Monument | 131 | 89 | 8.12 | 3.20 |
| **USFS Class II Areas** | | | | |
| Flaming Gorge National Recreation Area | 64 | 27 | 2.22 | 1.60 |
| High Uintas Wilderness Area | 85 | 52 | 3.32 | 2.22 |
| **USFWS Class II Areas** | | | | |
| Browns Park National Wildlife Refuge | 63 | 16 | 1.73 | 1.11 |

Acid deposition at the Class I and sensitive Class II areas were compared to the Deposition Analysis Thresholds (DATs) of 0.005 kilograms per hectare per year (kg/ha-yr) sulfur or nitrogen deposition and impact thresholds of 3 and 5 kg/ha-yr for sulfur and nitrogen deposition, respectively. The DATs are not an impact threshold, but rather represent estimated naturally occurring deposition prior to any anthropogenic influences. The DATs are levels below which estimated impacts from a proposed new or modified source are considered negligible. In cases where a source's impact equals or exceeds the DAT, the NPS/USFWS will make a project specific assessment of whether the projected increase in deposition would likely result in an "adverse impact" on resources considering existing AQRV conditions, the magnitude of the expected increase, and other factors. The results for the five closest areas evaluated are shown in **Table 4.2.1.1.4-3.** None of the impacts exceed the 3 and 5 kg/ha-yr impact thresholds. The DAT was exceeded at the closest Class I and Class II areas for nitrogen deposition, but not sulfur deposition. Implementation of the ACEPMS (Section 2.2.12) and the adaptive management strategy to mitigate potential ozone formation (Section 2.2.11) will also reduce the potential deposition of nitrogen.

**Table 4.2.1.1.4-3. Alternative A Acid Deposition Impacts at Closest Class I and Sensitive Class II Areas**

| Class I and Sensitive Class II Areas | Nitrogen Deposition (kg/ha-yr) | Sulfur Deposition (kg/ha-yr) |
|---|---|---|
| **NPS Class I Areas** | | |
| Arches National Park | 0.0028 | 0.00002 |
| **NPS Class II Areas** | | |
| Dinosaur National Monument | 0.0279 | 0.00020 |
| **USFS Class II Areas** | | |
| Flaming Gorge National Recreation Area | 0.0147 | 0.00008 |
| High Uintas Wilderness Area | 0.0150 | 0.00007 |
| **USFWS Class II Areas** | | |
| Browns Park National Wildlife Refuge | 0.0092 | 0.00006 |

In addition to analyzing potential acid deposition impacts at the Class I and II areas of interest, the potential for the Proposed Action to cause a change in ANC at 21 sensitive lakes was evaluated. The results are shown in the AQTSD. The potential for ANC change resulting from emissions associated with Alternative A was less than the evaluation thresholds of a 10 percent or 1 micro equivalent per liter change at all of the lakes evaluated. The greatest potential change in ANC was at Upper Ned Wilson Lake, 1.35 percent.

### 4.2.1.1.5 Potential Ozone Impacts

The BLM is developing a Uinta Basin specific photochemical modeling platform as part of its air resource management strategy (ARMS) for the Uinta Basin. The ARMS modeling platform will replace CALPUFF modeling for far-field project-specific and cumulative impact analyses. The ARMS platform will also become the standard photochemical modeling system for assessing project-specific and cumulative impacts on both near and far-field ozone concentrations. The ARMS modeling platform is not yet available and thus no project-specific photochemical modeling was performed for the Proposed Action and Alternatives. However, a cumulative and project specific ozone impact assessment was conducted as part of the Greater Natural Buttes (GNB) Final Environmental Impact Statement (FEIS) (BLM 2012). The GNB cumulative and ozone impact assessment evaluated the impacts of not only the proposed GNB project, but also the impacts of reasonably foreseeable development (RFD) in the Uinta Basin. The RFD impacts analyzed in the GNB FEIS explicitly included the Newfield Monument Butte project. Accordingly, until the ARMS modeling platform becomes available, reviewing and incorporating the GNB analysis is the most appropriate method to evaluate potential ozone impacts and cumulative impacts of the Proposed Action and Alternatives.

Potential ozone impacts are evaluated by comparing maximum potential ozone concentrations to the NAAQS and by determining the maximum incremental increase of ozone concentrations. The GNB FEIS analysis showed that cumulative emissions of all projects would not cause an exceedance of the NAAQS at any location in the modeling domain (the eastern two-thirds of Utah and all of Colorado west of the Front Range). The GNB FEIS showed that the proposed GNB project (3,675 wells) could cause an increase in ozone concentrations of 0.2 parts per billion (ppb) over much of Uintah County and into Colorado. The fourth-high maximum increase due to the proposed GNB project alone was 2.4 ppb. The contribution of emissions to potential ozone formation is not linear with respect to emissions, and the

Newfield Proposed Action of 5,750 wells should have approximately the same impact on ozone as the GNB project, due to the fact that the GNB and the proposed Monument Butte project are located in the same region, are subject to the same meteorological conditions, use the same drilling and operational techniques, and have similar total emissions of ozone precursors. The non-linearity of potential ozone impacts with respect to emissions was demonstrated in the GNB FEIS. Potential ozone precursor emissions ($NO_x$ plus VOC) for the GNB proposed project alone were 8,830 tons per year (tpy). GNB also analyzed the potential ozone impacts of an alternative action, the Optimal Recovery Alternative, with ozone precursor emissions of 29,922 tpy. The fourth-high maximum potential ozone increase under the Optimal Recovery Alternative was 4.9 ppb, even though the emissions evaluated were a factor of 3.4 greater than the GNB proposed project. Even though the Proposed Action contains more wells and potentially greater emissions than the GNB project (Proposed Action ozone precursor emissions of 16,051 tpy as indicated in **Table 4.2.1.1.1-1**), the emissions from each of these projects are a relatively small percentage of the total emissions of ozone precursors in the region (less than 5 to 10 percent). This fact and the fact that a potential increase in ozone is not linear with respect to emissions indicate that the Proposed Action and GNB would have approximately the same potential ozone impact.

The GNB FEIS ozone impact assessment uses the current "state of the art" photochemical models. These models have been demonstrated reasonable for traditional ozone formation, which occurs during the summer when photochemical reactions in the atmosphere are the largest. However, as discussed in Chapter 3, ozone concentrations exceeding the NAAQS have been observed during the winter months in the Uinta Basin. Methods for modeling and assessing this winter time ozone formation are in development (i.e., the ARMS modeling platform), but are not yet available. Therefore, the contribution of the Proposed Action and the contribution of cumulative emissions in the region to winter ozone exceedances cannot be determined at this time.

#### 4.2.1.1.6 Adaptive Management Strategy to Mitigate Potential Ozone Formation

The comparison of the No Action emissions to the Proposed Action emissions indicates that for the first several years of the project, emissions associated with the No Action Alternative would be greater than any of the Action Alternatives (A, C, or D). However, emissions for any of the Action Alternatives will eventually exceed the No Action emissions. Therefore, an Adaptive Management Strategy to mitigate the potential for adverse ozone formation would be implemented under the Proposed Action, Alternative C, and Alternative D. The Adaptive Management Strategy includes the following enhanced mitigation requirements, as further discussed in **Section 2.2.11**:

<u>Enhanced Inspection and Maintenance Program</u>

- FLIR/AVO inspections
    - Pneumatic devices / pumps
    - Tanks
    - Fugitives
- Frequency
    - Production sites with tank controls / compressor stations / gas plants
        - Annual FLIR inspection, with at least one inspection during Jan-Mar at highest priority sites based upon PTE limits considered significant to ozone formation (determined by operator)

        - AVO inspection by operators during any site visits Jan-Mar.
    - Production sites with no tank controls
        - Annual AVO inspections
        - AVO inspection by operators during any site visits Jan-Mar.
- Perform regular maintenance on pneumatic devices, dehydrators, combustors, engines and compressors
- Properly operate and maintain existing installed control equipment

Ozone Training for Operations Personnel – Operations personnel receive training prior to ozone season. Training programs should cover the following:

- Ozone – what it is and how to it impact air quality
- Ozone formation ingredients – NOx, VOCs, and weather conditions
- Ozone attainment status in the Uinta Basin
- Review of applicable regulations
- What can be done to prevent and/or reduce emissions of ozone precursor gases – limit driving, maintain equipment, delay optional activities until after inversion, etc. Emphasize importance of proper maintenance of tank hatches, vapor combustors, and other equipment that reduces emissions.

Work Practices

- Dehydrators
    - Perform charging of desiccant dehydration units prior to the winter ozone season
    - Reduce glycol dehydration circulation rates throughout entire winter ozone season
- Venting Blow Downs
    - Minimize blow down actions associated with energy recovery and production during the entire winter ozone season
- Venting – compressor startup and shutdown
    - Reduce the number of failed startups by performing regular maintenance of compressor throughout the entire winter ozone season
    - Reduce the number of compressor startups and shutdowns by having operating and maintenance schedules, and performing regular maintenance of compressors only during planned compressor shutdowns as possible throughout the entire winter ozone season
- Episodic Controls
    - Delay optional activities associated with energy recovery and production during periods of UDAQ ozone alert days.

- Take extra care to ensure proper maintenance and operation of equipment associated with energy recovery and production that may contribute to ozone formation during UDAQ ozone alert days.

#### 4.2.1.1.7 Potential Greenhouse Gas Emission Impacts

The assessment of GHG emissions and climate change remains in its earliest stages of formulation. Applicable EPA rules do not require any controls and have yet to establish any emission limits related to GHG emissions or impacts. The lack of scientific models that predict climate change on a regional or local level prohibits the project-specific quantification of potential future impacts on climate change. Potential GHG impacts are global and cumulative in nature only and are discussed in Chapter 5. GHG emissions for the Proposed Action at full project development are shown in **Table 4.2.1.1.1-1.**

### 4.2.1.2 Alternative B – No Action Alternative

#### 4.2.1.2.1 Emissions

Under the No Action Alternative, oil and gas development and production in the MBPA will continue to occur on state, private, and federal lands or minerals. As discussed in **Section 2.4**, a net total increase (net of new wells drilled minus wells converted or shut-in) of 788 wells (579 oil wells and 209 gas wells) could be drilled (up to 360 wells per year) and placed into production in the MBPA under the No Action Alternative. Emissions for the No Action Alternative are shown in **Table 4.2.1.2.1-1** and the details for the emission calculation are provided in the AQTSD.

**Table 4.2.1.2.1-1. No Action Alternative Emissions**

| Pollutant | Well Development (tpy) | Well Production (tpy) | Infrastructure (tpy) | Total Project Emissions (tpy) |
|---|---|---|---|---|
| *Criteria Pollutants* | | | | |
| **$NO_x$** | 931.2 | 661.4 | 224.7 | 1,817.3 |
| **CO** | 498.7 | 558.1 | 440.5 | 1,497.4 |
| **VOC** | 178.1 | 1,707.2 | 231.6 | 2,116.9 |
| **$SO_2$** | 1.0 | 1.3 | 0.5 | 2.8 |
| **$PM_{10}$** | 598.7 | 169.6 | 41.8 | 810.1 |
| **$PM_{2.5}$** | 89.6 | 53.4 | 13.9 | 157.0 |
| *HAPs* | | | | |
| **Benzene** | 0.43 | 11.16 | 2.17 | 13.75 |
| **Toluene** | 0.16 | 26.29 | 1.60 | 28.04 |
| **Xylene** | 0.10 | 42.79 | 0.37 | 43.26 |
| **Formaldehyde** | 0.043 | 32.89 | 16.87 | 49.80 |
| **Acrolein** | 0.0043 | 4.62 | 1.70 | 6.33 |
| **Total HAPs** | 0.98 | 196.07 | 30.55 | 227.61 |

| Pollutant | Well Development (tpy) | Well Production (tpy) | Infrastructure (tpy) | Total Project Emissions (tpy) |
|---|---|---|---|---|
| *GHGs* | | | | |
| **$CO_2$** | 94,746 | 249,841 | 117,217 | 461,805 |
| **$CH_4$** | 27.21 | 1,503 | 156 | 1,686 |
| **$N_2O$** | 0.76 | 0.47 | 0.22 | 1.45 |
| **GWP** | 95,553 | 281,549 | 120,563 | 497,665 |

The emissions shown for the No Action Alternative do not include the benefit of the ACEPMs that Newfield will implement associated with the Proposed Action Alternative. However, the estimates do include the benefit of the Oil and Gas NSPS because that regulation is applicable to future development. One of the main benefits of the NSPS is control on storage tanks with the potential to emit greater than 6 tpy. If none of the ACEPMs discussed under the Proposed Action are implemented, the storage tanks in the MBPA would have emissions less than the six (6) tpy threshold, and no controls would be applied. As in the case of the Proposed Action, the emission estimates for the No Action Alternative do not include benefits from future SIP, FIP, and NSR programs that may be implemented in the region in the near future. The emission estimates also do not include possible emission reductions from the Adaptive Management Strategy to mitigate potential ozone formation because the Strategy would not be implemented under the No Action Alternative.

Comparison of emission estimates in **Table 4.2.1.2.1-1** to the annual development emissions for the Proposed Action shown in **Table 4.2.1.1.1-3** shows that for the first few years of the project, the No Action Alternative emissions are greater than for the Proposed Action. Development of the Proposed Action can continue into approximately early calendar year 2021 for total ozone precursor (NOx plus VOC) emissions, late 2019 for VOC emissions alone, and beyond 2022 for NOx emissions alone without causing an increase greater than the No Action Alternative.

#### 4.2.1.2.2 Potential Near-Field and HAP Impacts

Potential near-field impacts are a function of isolated local activities, not total emissions or field-wide activities. Accordingly, although under the No Action Alternative there will be fewer total wells and activities in the region, the near-field impact with respect to criteria pollutant impacts from construction and development of wells will be the same under Alternative B as that for Alternative A. The maximum near-field impacts of emissions with respect to operational activities from Alternatives B and A on criteria pollutants other than ozone and HAPs are expected to be approximately the same. However, it is possible that near-field impacts under Alternative B will be greater than those for Alternative A because not all of the ACEPMs for Alternative A will be implemented under the No Action Alternative. Other than the ACEPMs, the individual well site and activities of both Alternatives are essentially the same and the infrastructure activities under Alternative B are typically less than those for Alternative A.

#### 4.2.1.2.3 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Since the emissions under Alternative B are less than those for Alternative A, the overall visual air quality and AQRV impact would also be the same or less than those for Alternative A.

#### 4.2.1.2.4 Potential Ozone Impacts

For the first few years of the project, ozone precursor emissions under the No Action Alternative would be greater than those for the Proposed Action and thus, the potential ozone impacts may also be slightly greater if, as is suspected, regional oil and gas emissions are a major contributor to local ozone formation. On the other hand, eventually the Proposed Action emissions will exceed No Action Alternative emissions, and at that time, the potential ozone impact of the No Action Alternative may be less than that for the Proposed Action. However, ozone formation is not linear with respect to emissions, and thus the magnitude of the difference is not quantifiable. **Table 6-1** of Appendix B shows the comparison between specific emission values for ozone precursors between the annual Proposed Action development and the No Action Alternative.

#### 4.2.1.2.5 Potential Greenhouse Gas Emission Impacts

The greenhouse gas emissions shown in **Table 4.2.1.2.1-1** for Alternative B are less than those for Alternative A as shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change would also be less. However, the magnitude of such a difference is not quantifiable and is likely to be *de minimis* because the GHG emissions of both Alternatives are so small with respect to total emissions on a state, national, or global basis.

### 4.2.1.3 Alternative C – Field-Wide Electrification

#### 4.2.1.3.1 Emissions

Under Alternative C, Newfield would replace fossil-fueled stationary engines (pumpjack engines, compressor engines, and on-site electrical generators) with electric motors. The electrical energy to supply those motors would come from either Newfield-constructed substations and electrical generators (total of 550 MWe of power) or from commercial electrical energy. **Table 4.2.1.3.1-1** shows the emissions that could occur under Alternative C when the entire project is developed and all of the electrical energy is provided by electrical generators built by Newfield.

It is possible that rather than Newfield providing the electrical energy, commercial electrical power could be obtained and used for a portion or all of the MBPA. If all of the required electrical energy were obtained from commercial sources, the ultimate development emissions for Alternative C would decrease to the values shown in **Table 4.2.1.3.1-2.**

#### 4.2.1.3.2 Potential Near-Field and HAP Impacts

Under Alternative C there would be lower total emissions than those for Alternative A, even though there would be the same number of oil and gas wells and oil and gas infrastructure for Alternative C as compared to those under Alternative A. There is an overall reduction in emissions even when the emissions from the turbine generators are added. It is more efficient to have large turbine generators creating electricity than having individual fossil-fueled field engines.

There is the same number of oil and gas wells in Alternative C as compared to Alternative A and the well-site construction and development activities are the same in both Alternatives. Because potential near-field impacts are a function of isolated local activities, not total emissions or field-wide activities, the potential ambient air quality impact of the construction and development activities for the oil and gas wells under Alternative C are the same as that for Alternative A. Alternative C includes construction of

substations and transmission lines. This construction is similar to well pad, pipeline, and road construction under Alternative A, and maximum construction impacts are localized. Therefore, potential near-field impacts of construction would be essentially the same for Alternatives C and A.

Operational impacts of Alternative C when Newfield is providing the electrical energy with turbine generators would be less than those for Alternative A since local well pad emissions decrease due to replacement of well-site engines with electric motors. Dispersion modeling discussed in the AQTSD demonstrated that the potential impact of the turbine generators is less than the other activities of Alternative A. If commercial electrical energy is used to supply all or part of the MBPA, the potential near-field impacts would be even less.

**Table 4.2.1.3.1-1. Ultimate Development Emissions Under Alternative C (On-site Substations and Electrical Generators)**

| Pollutant | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Total Emissions (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| *Criteria Pollutants* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$NO_x$** | 129.6 | 344.6 | 250.1 | 724.3 | 668.6 | 511.1 | 90.8 | 1,270.5 | 1,994.8 |
| **CO** | 106.0 | 290.9 | 269.2 | 666.1 | 594.3 | 523.1 | 165.9 | 1,283.2 | 1,949.3 |
| **VOC** | 12.1 | 3,532.4 | 580.8 | 4,125.3 | 35.9 | 3,795.8 | 409.2 | 4,240.9 | 8,366.2 |
| **$SO_2$** | 0.2 | 2.0 | 2.0 | 4.1 | 1.2 | 2.9 | 1.2 | 5.3 | 9.4 |
| **$PM_{10}$** | 423.3 | 410.6 | 376.7 | 1,210.6 | 1,145.1 | 283.0 | 70.3 | 1,498.4 | 2,709.0 |
| **$PM_{2.5}$** | 46.0 | 64.4 | 79.1 | 189.6 | 128.4 | 61.8 | 42.4 | 232.7 | 422.3 |
| *HAPs* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **Benzene** | 0.084 | 9.84 | 3.92 | 13.84 | 0.519 | 26.15 | 12.76 | 39.43 | 53.27 |
| **Toluene** | 0.031 | 8.83 | 3.91 | 12.78 | 0.188 | 48.84 | 10.63 | 59.66 | 72.44 |
| **Xylene** | 0.020 | 2.74 | 1.16 | 3.92 | 0.1290 | 37.30 | 2.44 | 39.86 | 43.78 |
| **Formal-dehyde** | 0.0080 | 0.25 | 4.21 | 4.47 | 0.0527 | 0.36 | 4.91 | 5.32 | 9.79 |
| **Acrolein** | 0.00080 | --- | 0.037 | 0.038 | 0.00527 | --- | 0.044 | 0.049 | 0.087 |
| **Total HAPs** | 0.26 | 183.91 | 41.53 | 225.69 | 1.05 | 211.21 | 42.23 | 254.48 | 480.17 |
| *GHGs* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$CO_2$** | 18,776 | 394,514 | 1,018,246 | 1,431,536 | 116,923 | 602,127 | 983,856 | 1,702,905 | 3,134,441 |
| **$CH_4$** | 18.81 | 3,809 | 665 | 4,492 | 4.60 | 7,152 | 933 | 8,090 | 12,582 |
| **$N_2O$** | 0.15 | 0.74 | 1.90 | 2.80 | 0.93 | 1.13 | 1.85 | 3.91 | 6.71 |
| **GWP** | 19,218 | 474,727 | 1,032,792 | 1,526,737 | 117,308 | 752,679 | 1,004,029 | 1,874,015 | 3,400,752 |

**Table 4.2.1.3.1-2. Ultimate Development Emissions Under Alternative C (Off-site Commercial Source of Electrical Energy)**

| Pollutant | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Total Emissions (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| *Criteria Pollutants* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$NO_x$** | 129.6 | 344.6 | 202.5 | 676.7 | 668.6 | 511.1 | 33.7 | 1,213.3 | 1,890.0 |
| **CO** | 106.0 | 290.9 | 225.8 | 622.6 | 594.3 | 523.1 | 113.7 | 1,231.1 | 1,853.7 |
| **VOC** | 12.1 | 3,532.4 | 564.2 | 4,108.7 | 35.9 | 3,795.8 | 389.4 | 4,221.1 | 8,329.8 |
| **$SO_2$** | 0.2 | 2.0 | 1.0 | 3.2 | 1.2 | 2.9 | 0.1 | 4.2 | 7.4 |
| **$PM_{10}$** | 423.3 | 410.6 | 344.8 | 1,178.7 | 1,145.1 | 283.0 | 32.1 | 1,460.2 | 2,638.9 |
| **$PM_{2.5}$** | 46.0 | 64.4 | 47.3 | 157.8 | 128.4 | 61.8 | 4.2 | 194.5 | 352.3 |
| *HAPs* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **Benzene** | 0.084 | 9.84 | 3.85 | 13.77 | 0.519 | 26.15 | 12.68 | 39.35 | 53.12 |
| **Toluene** | 0.031 | 8.83 | 3.17 | 12.03 | 0.188 | 48.84 | 9.74 | 58.76 | 70.79 |
| **Xylene** | 0.020 | 2.74 | 0.79 | 3.55 | 0.1290 | 37.30 | 1.99 | 39.42 | 42.97 |
| **Formal-dehyde** | 0.0080 | 0.25 | 0.13 | 0.38 | 0.0527 | 0.36 | 0.01 | 0.43 | 0.81 |
| **Acrolein** | 0.00080 | --- | 0.000 | 0.001 | 0.00527 | --- | 0.000 | 0.005 | 0.006 |
| **Total HAPs** | 0.26 | 183.91 | 35.62 | 219.79 | 1.05 | 211.21 | 35.14 | 247.39 | 467.18 |
| *GHGs* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$CO_2$** | 18,776 | 394,514 | 242,780 | 656,070 | 116,923 | 602,127 | 53,296 | 772,345 | 1,428,415 |
| **$CH_4$** | 18.81 | 3,809 | 650 | 4,477 | 4.60 | 7,152 | 916 | 8,073 | 12,550 |
| **$N_2O$** | 0.15 | 0.74 | 0.44 | 1.33 | 0.93 | 1.13 | 0.09 | 2.16 | 3.49 |
| **GWP** | 19,218 | 474,727 | 256,565 | 750,510 | 117,308 | 752,679 | 72,556 | 942,543 | 1,693,053 |

#### 4.2.1.3.3 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Since the emissions are less under Alternative C than those for Alternative A, the overall visual air quality and AQRV impact would also be the same or less than those for Alternative A.

#### 4.2.1.3.4 Potential Ozone Impacts

The annual emissions are less under Alternative C than those for Alternative A. In addition, the same regulations, emission reduction programs, ACEPMs, and Adaptive Management Strategy to mitigate potential ozone formation apply to both Alternative C and Alternative A. If the regional oil and gas emissions are a contributor to local ozone formation (as is suspected), then the potential impacts on ozone would be the same or less for Alternative C than those for Alternative A. However, ozone formation is not linear with respect to emissions, and thus the magnitude of the difference is not quantifiable.

#### 4.2.1.3.5 Potential Greenhouse Gas Emission Impacts

The greenhouse gas emissions shown in **Tables 4.2.1.3.1-1** for the Alternative C case where Newfield provides all electrical energy through on-site generators are slightly greater than the greenhouse gas emissions for the Proposed Action shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change for Alternative C where Newfield provides all electrical energy through on-site generators would be slightly greater or the same as Alternative A. For the case where electrical energy is provided from off-site commercial sources, the potential greenhouse gas emissions shown in **Table 4.2.1.3.1-2** for Alternative C are less than those for Alternative A as shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change would also be less in this case. However, the magnitude of any differences in potential climate change impact is not quantifiable and is likely to be *de minimis* because the GHG emissions are so small with respect to total emissions on a state, national, or global basis.

### 4.2.1.4 Alternative D – Resource Protection Alternative

#### 4.2.1.4.1 Emissions

Fewer wells would be drilled and operating under Alternative D than those for Alternative A (5,058 oil and gas wells compared to 5,750 wells). The oil and gas operations at the well sites and the oil and gas infrastructure activities for Alternative D are the same as those for Alternative A, but there are a smaller total number of wells. Emissions under Alternative D are shown in **Table 4.2.1.4.1-1.**

#### 4.2.1.4.2 Potential Near-Field and HAP Impacts

Potential near-field impacts are a function of isolated local activities, not total emissions or field-wide activities. Accordingly, although under the Alternative D there will be fewer total wells and activities in the region, the near-field impact with respect to criteria pollutant impacts from construction and development of wells will be the same under Alternative D as those for Alternative A. Likewise, the operational impacts of Alternative D will be the same as those for Alternative A for criteria pollutants other than ozone and for HAPs, because the maximum impacts are from local individual well operations or individual infrastructure facilities.

#### 4.2.1.4.3 Potential Far-Field Visual Air Quality and Air Quality Related Value Impacts

Since the emissions are less under Alternative D than those for Alternative A, the overall visual air quality and AQRV impact would also be the same or less than those for Alternative A.

#### 4.2.1.4.4 Potential Ozone Impacts

Annual emissions are less under Alternative D than those for Alternative A. Furthermore, the same regulations, emission reduction programs, ACEPMs, and Adaptive Management Strategy to mitigate potential ozone formation apply to both Alternative D and Alternative A. If the regional oil and gas emissions are a contributor to local ozone formation (as is suspected), then the potential impacts on ozone would be the same or less for Alternative D than those for Alternative A. However, ozone formation is not linear with respect to emissions, and thus the magnitude of the difference is not quantifiable.

**Table 4.2.1.4.1-1. Ultimate Development Emissions Under Alternative D**

| Pollutant | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Well Development (tpy) | Well Production (tpy) | Infra-structure (tpy) | Total Emissions (tpy) | Total Emissions (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| *Criteria Pollutants* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$NO_x$** | 153.3 | 2,137.3 | 468.8 | 2,759.4 | 472.8 | 315.0 | 1,353.7 | 2,141.5 | 4,900.9 |
| **CO** | 128.2 | 2,630.5 | 812.2 | 3,570.9 | 419.5 | 324.5 | 2,747.1 | 3,491.2 | 7,062.1 |
| **VOC** | 14.4 | 5,250.8 | 592.7 | 5,857.8 | 25.4 | 2,336.8 | 1,260.2 | 3,622.4 | 9,480.2 |
| **$SO_2$** | 0.2 | 5.3 | 1.5 | 7.0 | 0.9 | 1.8 | 2.9 | 5.5 | 12.5 |
| **$PM_{10}$** | 511.8 | 830.8 | 253.1 | 1,595.7 | 807.8 | 208.7 | 75.1 | 1,091.6 | 2,687.3 |
| **$PM_{2.5}$** | 55.0 | 276.1 | 57.8 | 388.8 | 90.7 | 41.5 | 51.9 | 184.2 | 573.0 |
| *HAPs* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **Benzene** | 0.10 | 20.74 | 2.14 | 22.98 | 0.37 | 16.10 | 11.95 | 28.41 | 51.39 |
| **Toluene** | 0.039 | 15.91 | 1.34 | 17.29 | 0.13 | 30.06 | 9.32 | 39.52 | 56.81 |
| **Xylene** | 0.024 | 4.85 | 0.43 | 5.31 | 0.09 | 22.96 | 2.15 | 25.20 | 30.51 |
| **Formal-dehyde** | 0.0098 | 197.93 | 14.23 | 212.17 | 0.037 | 0.22 | 126.30 | 126.56 | 338.73 |
| **Acrolein** | 0.00098 | 27.84 | 1.81 | 29.66 | 0.0037 | --- | 12.31 | 12.31 | 41.97 |
| **Total HAPs** | 0.32 | 543.44 | 43.33 | 587.09 | 0.74 | 130.02 | 202.86 | 333.62 | 920.71 |
| *GHGs* | | | | | | | | | |
| | Oil Wells | | | | Gas Wells | | | | Project Total |
| **$CO_2$** | 22,950 | 1,049,077 | 315,150 | 1,387,177 | 82,477 | 370,729 | 608,232 | 1,061,438 | 2,448,615 |
| **$CH_4$** | 23.14 | 4,377 | 343 | 4,743 | 3.24 | 4,403 | 794 | 5,200 | 9,943 |
| **$N_2O$** | 0.189 | 1.98 | 0.58 | 2.75 | 0.657 | 0.70 | 1.14 | 2.50 | 5.25 |
| **GWP** | 23,495 | 1,141,609 | 322,527 | 1,487,631 | 82,749 | 463,409 | 625,260 | 1,171,418 | 2,659,049 |

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#### 4.2.1.4.5 Potential Greenhouse Gas Emission Impacts

The GHG emissions shown in **Table 4.2.1.4.1-1** for Alternative D are less than those for Alternative A as shown in **Table 4.2.1.1.1-1**. Therefore, the potential impact on climate change would also be less. However, the magnitude of such a difference is not quantifiable and is likely to be *de minimis* because the GHG emissions are so small with respect to total emissions on a state, national, or global basis.

### 4.2.2 Mitigation

Under Alternatives A, C, and D, air quality mitigation measures and implementation BMPs to reduce emissions and potential air quality impacts would be necessary. A list of ACEPMs with respect to air quality is presented in **Section 2.2.12.1**.

Additional mitigation measures that complement the ACEPMs would be required by Federal New Source Performance Standards (e.g., 40 CFR 60 Subpart OOOO); Utah state permitting guidance and requirements; SIP, FIP, and NSR programs that may be promulgated in the near future; and possible mitigation under the Adaptive Management Strategy to mitigate potential ozone formation. The additional mitigation measures that may be required under the Adaptive Management Strategy have not yet been identified.

### 4.2.3 Unavoidable Adverse Impacts

An increase in emissions of criteria pollutants, HAPs, and GHGs as a result of the project would be expected for the LOP.

### 4.2.4 Irretrievable and Irreversible Commitments of Resources

There are no irretrievable or irreversible commitments of air quality resources because reclamation and revegetation of surface disturbances would be accomplished when production at individual sites has ceased and emissions are no longer occurring from those sites. Air quality could be impacted in and around the MBPA for the LOP.

### 4.2.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of oil and gas facilities and infrastructure would provide a short-term mineral use that would result in temporary impacts to air quality. The impacts would persist throughout the LOP.

## 4.3 GEOLOGY AND MINERALS

### 4.3.1 Direct and Indirect Effects

#### 4.3.1.1 Alternative A – Proposed Action

Potential impacts to geologic and mineral resources from the Proposed Action include changes to local physiography and topography; decreased slope stability; depletion of oil and natural gas resources; and interference with potential mining of Gilsonite, tar sands, oil shale, and other leasable, locatable, and salable minerals within the MBPA.

#### 4.3.1.1.1 Physiography and Topography

Excavation for the construction of well pads, pipelines, central facilities, access roads, and other project facilities would cause topographic changes, including square- or rectangular-shaped cuts and fills in the unconsolidated alluvial and colluvial deposits within the MBPA. These changes to the topographic character of the area would be minor but long-term. The primary impact of these topographic changes would be on visual resources. Visual impacts are described in **Section 4.14**.

#### 4.3.1.1.2 Geologic Hazards

Surface disturbing activities that create steep slopes or that are located in areas of instability associated with naturally occurring inter-bedded resistant and erodible layers of exposed geologic formations could promote geologic hazards such as landslides, slumps, and debris flows. The potential for increased landslides from the Proposed Action is considered to be minor because none of the geologic units exposed in the area have a high potential for mass movements. As discussed in **Section 3.3.3**, landslide susceptibility within the MBPA is classified as low to very low. Some small slumps may occur in the cuts created for the new access roads, pipelines, compressor stations, and well pads. However, these slumps would be localized in extent and would not affect any existing structures. Debris flows occur at the mouths of narrow side canyons within the MBPA, such as portions of Wells Draw and Gilsonite Draw. The Proposed Action is unlikely to have any appreciable effect on the frequency or magnitude of these flows.

#### 4.3.1.1.3 Oil and Natural Gas

Potential impacts to oil and natural gas resources include the depletion of these resources due to active extraction. While the ultimate recovery of oil and natural gas from the MBPA at full development is unknown, it is estimated that the maximum development of the 5,750 wells under the Proposed Action would result in a potential recovery of over 335 Mmbo, 540,669 Mmcf of natural gas, and 10,085 Mbbl of NGLs from the Green River Formation over the 41- to 51-year LOP. In addition, development of deep gas wells could yield an additional estimated 6.9 Tcf of natural gas (see **Table 4.3.1.1.3-1**). These oil and gas resources would be removed from the subsurface and no longer would be available for extraction.

**Table 4.3.1.1.3-1. Summary of Oil and Natural Gas Resources Extracted by Alternative**

| Resource | Alternative A (Proposed Action) | Alternative B (No Action) | Alternative C (Field-wide Electrification) | Alternative D (Resource Protection) |
|---|---|---|---|---|
| **Oil (Mmbo)** | 335 | 64 | 335 | 294 |
| Percentage of Total Reserves[1] | 6.2 % | 1.2 % | 6.2 % | 5.4 % |
| **Natural Gas (Tcf)** | 7.4 | 1.2 | 7.4 | 6.4 |
| Percentage of Total Reserves[2] | 28.5 % | 4.6 % | 28.5 % | 24.6 % |
| **Natural Gas Liquids (Mbbl)** | 10,085 | 1,662 | 10,085 | 8,722 |
| Percentage of Total Reserves | Unknown | Unknown | Unknown | Unknown |
| **Total Number of Wells** | 5,750 | 788 | 5,750 | 5,058 |

[1]Assumes 5,400 Mmbo reserves are present within the Uinta Basin (Newfield 2012).
[2]Assumes up to 26 Tcf of natural gas reserves are available within the Uinta Basin (USGS 2002).

Newfield has estimated that there is currently some 5,400 Mmbo reserves present within the Uinta Basin (Newfield 2012). The maximum development of the 5,750 wells under the Proposed Action would result in a potential recovery of over 335 Mmbo over the LOP, decreasing the presumed total available oil reserves in the Uinta Basin by approximately 6.2 percent. In addition, The USGS estimates there is up to 26 Tcf of natural gas reserves in the Uinta Basin (USGS 2002). While the National Research Council of the National Academies acknowledges that there exists a large amount of uncertainty associated with this estimate, it is acknowledged that for purposes of analysis in this EIS that this presumed total is likely an underestimate of the total amount of natural gas reserves present in the Uinta Basin. Nonetheless, implementation of the Proposed Action would yield approximately 7.4 Tcf of natural gas over the LOP, thus decreasing the total purported reserves of natural gas in the Uinta Basin by approximately 29 percent.

In addition to oil and natural gas extraction, impacts to oil and gas reserves are also anticipated. Because these resources are below the surface, they are not susceptible to surface disturbing activities. However, sub-surface resources could be impacted by drilling through the geologic formations above the targeted formation and subsequent fracturing of the targeted formation to enhance production recovery, as well as direct physical obstructions from well casings.

#### 4.3.1.1.4 Gilsonite, Tar Sands, and Oil Shale

Development related to the Proposed Action could potentially conflict with future Gilsonite, oil shale, and tar sands development. Direct and indirect impacts to these mineral resources would include the potential for contamination of the resource by drilling fluids, physical obstruction of resources by well casings, as well as surface disturbance in the area open to saleable mineral leasing. Some of the leases in the area are combined hydrocarbon leases that allow extraction of oil, gas, oil shale, or tar sands.

Commercial Gilsonite deposits are restricted to the Uinta Basin and mapped Gilsonite veins cross the MBPA; however, there is no current production or authorized leases within the MBPA. As such there would be no impacts to Gilsonite leases because the nearest active lease is located approximately 13 miles southeast of the MBPA. Although expanded oil and gas development could lead to potential conflicts with future Gilsonite exploitation within the MBPA, the probability of such conflict is expected to be low.

Approximately 14,206 acres within the MBPA are classified as Special Tar Sand Areas (STSAs) open to commercial tar sand leasing. Under the Proposed Action, approximately 1,858 acres (13 percent) of these areas would be impacted by surface disturbance. Approximately 24,966 acres (21 percent) of the MBPA overlies areas of high oil shale development potential defined as KOSLAs. Under the Proposed Action, approximately 2,863 acres (11 percent) of these areas would be impacted by surface disturbance. No impacts are anticipated because no active mines are present in the area and are not likely to be developed in the future given the current density of well bores in the area. However, since these resources are found below the surface, development would be difficult because existing oil and gas facilities occupying the land would prohibit access to areas below the facilities.

#### 4.3.1.1.5 Other Leasable, Locatable, and Salable Minerals

Implementation of the Proposed Action could potentially conflict with future extraction of minerals from sand and gravel pits in the MBPA. Direct and indirect impacts to these mineral resources would include the potential for contamination of the resource by drilling fluids, physical obstruction of resources by well casings, as well as surface disturbance in the area open to saleable mineral leasing. No impacts are anticipated to other locatable minerals such as uranium, base metals, phosphate rock, or gypsum because

no current mining claims have been staked and little development potential exists to extract minor deposits of these resources.

#### 4.3.1.2 Alternative B – No Action Alternative

Impacts to geological and mineral resources under the No Action Alternative would be similar in nature to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative because only 788 new oil and gas wells would be developed on BLM, State and private lands in the MBPA. The overall surface disturbance would be approximately 870 acres, which is 95 percent less than the Proposed Action.

Development of the 788 wells proposed under the No Action Alternative would result in a potential recovery of an estimated 64 Mmbo over the LOP, decreasing the presumed total available oil reserves in the Uinta Basin by approximately 1.2 percent (see **Table 4.3.1.1.3-1**). In addition, implementation of the No Action Alternative would yield approximately 1.2 Tcf of natural gas over the LOP, thus decreasing the total estimated reserves of natural gas in the Uinta Basin by approximately 4.6 percent.

Correspondingly, impacts to physiography and topography; geologic hazards; and Gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be proportionately less under Alternative B. Under the No Action Alternative, approximately 54 acres (0.2 percent) of KOSLAs and 38 acres (0.3 percent) STSAs within the MBPA would be impacted by surface disturbance.

#### 4.3.1.3 Alternative C – Field-wide Electrification

Impacts to geological and mineral resources Alternative C would be nearly identical in nature and scope to those described for the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. Correspondingly, impacts to physiography and topography; geologic hazards; oil and gas resources; Gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be identical to those described for the Proposed Action.

#### 4.3.1.4 Alternative D – Resource Protection Alternative

Impacts to geological and mineral resources under the Alternative D would be similar in nature to those described for the Proposed Action. However, potential impacts would be less under the Alternative D, as 5,058 new oil and gas wells would be developed on BLM, State and private lands or minerals in the MBPA. The overall surface disturbance would be approximately 9,805 acres, which is 61 percent less than that under the Proposed Action.

Development of the 5,058 wells proposed under the Alternative D would result in a potential recovery of an estimated 294 Mmbo over the LOP, decreasing the presumed total available oil reserves in the Uinta Basin by approximately 5.4 percent (see **Table 4.3.1.1.3-1**). In addition, implementation of Alternative D would yield approximately 6.4 Tcf of natural gas over the LOP, thus decreasing the total estimated reserves of natural gas in the Uinta Basin by approximately 25 percent.

Correspondingly, impacts to physiography and topography; geologic hazards; Gilsonite, tar sands, and oil shale; and other leasable, locatable, and salable minerals within the MBPA would be proportionately less

under Alternative D. Under this alternative, approximately 1,207 acres (5 percent) of KOSLAs and 1,179 acres (8 percent) STSAs within the MBPA would be impacted by surface disturbance.

### 4.3.2 Mitigation

All applicable Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) could be incorporated as needed to avoid resource conflicts or impacts to mineral resources.

### 4.3.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts to mineral resources would include the potential to adversely impact Gilsonite, tar sands, and oil shale through contamination of the resource by drilling fluids and physical obstruction of resources by well casings, as well as surface disturbance in the area open to saleable mineral leasing. This would occur under all of the alternatives to varying degrees, depending on the number of wells.

### 4.3.4 Irretrievable and Irreversible Commitments of Resources

Irretrievable and irreversible resources would include impacts to Gilsonite, tar sands, and oil shale through potential contamination of the resource by drilling fluids and physical obstruction of the resources by well casings. There would also be irretrievable and irreversible impacts to salable minerals because of surface disturbance in areas open to saleable mineral leasing. This would occur to varying degrees under all of the alternatives, depending on the number of wells. All oil and natural gas that is extracted from the MBPA would be removed irreversibly for future extraction.

### 4.3.5 Relationship of Short-Term Uses to Long-Term Productivity

Because of subsurface impacts to mineral resources, short-term uses would have an adverse impact on long-term productivity for Gilsonite, tar sands, and oil shale in the immediate location of wells. Surface disturbance at well sites would primarily affect long-term productivity for surface resources, such as salable minerals. However, because the acres of mineral resources impacted by all alternatives would be low, and better availability of some resources exist outside the MBPA, overall long-term impacts to the productivity of mineral resources would be minor.

## 4.4 PALEONTOLOGICAL RESOURCES

The loss of any identifiable fossil that embodies the distinctive characteristics of a type of prehistoric organism or provides information regarding prehistory would be an adverse impact. Direct impacts on paleontological resources would include the potential destruction of paleontological resources and the loss of information associated with these resources. Project excavations may result in the destruction of paleontological resources and subsequent loss of information if potentially fossiliferous bedrock or surface sediments are disturbed. Conversely, construction activities might beneficially affect paleontological resources if fossils are exposed that may never have been unearthed by natural means. Such newly exposed fossils would become available for scientific analysis and study, thus adding new information about these resources.

Indirect impacts to paleontological resources would include the compaction or fracturing of surface deposits of fossiliferous bedrock through daily operation of project activities, such as regular road

maintenance. Another example of possible adverse indirect impacts would be an increase in unauthorized fossil collection or vandalism due to increased access on newly constructed roads within the MBPA.

In general the greater the degree of construction-related ground disturbance in the Green River and Uinta formations, the higher the potential for adverse impacts on paleontological resources. Adverse impacts on paleontological resources include direct impacts related to ground-disturbance actions involved with construction of the elements of the Proposed Action, and indirect impacts related to the maintenance of the elements.

The nature of potential impacts on paleontological resources would be the same under all alternatives. However, the extent of impacts would vary by alternative, based on the amount of short-term surface disturbance that would occur on PFYC system Class 2, 3, and 5 lands (see **Table 4.4-1)** below. The general nature potential impacts common to all alternatives is discussed under the Proposed Action. Impacts related to the Proposed Action and other Action Alternatives are compared to those for the No Action Alternative.

**Table 4.4-1. Acreage and Percentage of Land Disturbance by Alternative in PFYC-classified Areas with High Potential to Yield Fossils**

| PFYC | Total Acres in MBPA | Alternative A – Proposed Action (percent) | Alternative B - No Action Alternative (percent) | Alternative C – Field-Wide Electrification (percent) | Alternative D – Resource Protection (percent) |
|---|---|---|---|---|---|
| Class 2 | 19,945 | 2,334 (12) | 122 (0.6) | 2,355 (12) | 1,171 (6) |
| Class 3 | 6,790 | 1,040 (15) | 100 (1.5) | 1,241 (18) | 841 (12) |
| Class 5 | 93,061 | 6,691 (7) | 243 (0.3) | 7,025 (8) | 4,890 (5) |
| TOTAL | 119,796 | 10,066 (8) | 465 (0.4) | 10,621 (9) | 6,872 (6) |

## 4.4.1 Direct and Indirect Effects

### 4.4.1.1 Alternative A - Proposed Action

Potential indirect adverse impacts on paleontological resource are most likely to occur where maintenance or future-proposed actions occur in areas containing the bedrock strata of the Green River and Uinta formations. These activities include the grading of access roads and construction of well pads and infrastructure components (i.e., compressor stations, gas processing plant, pump stations, etc.).

Paleontological resources provide scientific data when they are recovered directly from the rock layer in which they were preserved. In most cases, the depth and lateral extent of fossiliferous deposits are unknown until they are discovered, either by chance or as the result of some level of systematic scientific testing. Even if the depth and extent of project-related surface-disturbing activities are known, exact impacts cannot be calculated because the relationship of the discovered fossils to the remaining undiscovered fossils is unknown. Therefore, any analysis of the potential impacts must rely on data that estimate the potential for sensitivity of particular geologic units based on the frequency and density of earlier paleontological surveys and discoveries.

For the Proposed Action, a total of 10,066 acres of PFYC Class 2, 3, and 5 lands (approximately 8 percent of the MBPA) would be involved in surface-disturbing activities (refer to **Table 4.4-1**). Approximately 67 percent (6,691 acres) of the disturbance from the Proposed Action would occur on Class 5 land (i.e., land having the highest potential for fossil material). In addition, approximately 23 percent of the proposed disturbance would occur on Class 2 land (i.e., land having the lowest potential for fossil material), and approximately 10 percent would occur on Class 3 land (i.e., land having moderate or unknown potential for fossil material). The Proposed Action would result in the second highest total surface disturbance in paleontological sensitive land (10,066 acres), second only to Alternative C, which would involve a total of approximately 10,621 acres.

The ACEPMs outlined in **Section 2.2.12.2** would require paleontological surveys in sensitive areas prior to any surface disturbance. In the event important fossils were identified, work would be temporarily halted until a site-specific mitigation plan is developed and implemented. These actions would minimize direct impacts to surface fossils.

If paleontological monitoring and mitigation procedures were implemented, it is likely that potential adverse impacts could be further minimized and possibly converted to potential beneficial impacts. Should important fossils be identified, the site-specific recovery/avoidance plan could involve recordation and removal of the discovery from the site for permanent preservation at a repository site for future public education and enjoyment. Any scientifically significant fossils discovered and salvaged as a result of the project's surface-disturbing activities would benefit the scientific community through an increased knowledge of the fossils and understanding of the contextual setting of the fossils in the basin.

The potential for indirect adverse impacts to paleontological resources as a result of the operations and maintenance activities associated with the Proposed Action is low because daily operations and maintenance activities would be confined to the pre-disturbed (and thus pre-surveyed) areas. A second potential indirect adverse impact would include a greater risk of illegal fossil collection due to the increased access provided by project-related roads. Under the Proposed Action, approximately 243 miles of new roads would be constructed which would increase the potential for illegal fossil collection.

#### 4.4.1.2 Alternative B – No Action

Impacts to paleontological resources under the No Action Alternative would be similar in nature and scope to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative because only 788 new oil and gas wells would be developed on BLM, State, and private lands in the MBPA. The overall surface disturbance would be approximately 870 acres, which is 95 percent less than the Proposed Action.

Under Alternative B, impacts to fossil resources would result in approximately 465 acres of surface disturbance on PFYC Class 2, 3, and 5 lands (refer to **Table 4.4-1**). Approximately 243 acres (52 percent) of the potential disturbance for Alternative B would occur on Class 5 land. Indirect adverse impacts to paleontological resources associated with an expanded road network would result from 23 miles of new roads, which is a 91 percent decrease as compared to those under the Proposed Action.

#### 4.4.1.3 Alternative C – Field-Wide Electrification

Impacts to paleontological resources under Alternative C would be nearly identical in nature and scope to those described for the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. Under Alternative C, approximately 10,621 acres in PFYC-classified areas would be disturbed (refer to **Table 4.4-1**). Approximately 7,025 acres (66 percent) of the potential disturbance for Alternative C would occur on Class 5 land. Under Alternative C, indirect adverse impacts to paleontological resources associated with an expanded road network would be nearly identical to that of the Proposed Action.

#### 4.4.1.4 Alternative D – Resource Protection Alternative

Impacts to geological and mineral resources under the Alternative D would be similar in nature to those described for the Proposed Action. However, potential impacts would be less under the Alternative D because 5,058 new oil and gas wells would be developed on BLM, State, and private lands or minerals in the MBPA. The overall surface disturbance would be approximately 9,805 acres, which is 61 percent less than that under the Proposed Action. Under the Alternative D, approximately 73 miles of new roads would be constructed, which would increase the potential for illegal fossil collection above existing conditions. However, as this is approximately 170 fewer miles of road (i.e., far less public access under Alternative D) than the Proposed Action, the increase in risk of illegally fossil collections is smaller in comparison.

For Alternative D, a total of 6,872 acres of PFYC-classified areas would be disturbed (refer to **Table 4.4-1**). In relation to the other alternatives presented, Alternative D would affect a 32 percent and 35 percent decrease from the total disturbance associated with the Proposed Action and Alternative C, respectively.

### 4.4.2 Mitigation

Additional mitigation that is proposed beyond the ACEPMs is detailed in **Section 2.2.12.2**.

### 4.4.3 Unavoidable Adverse Impacts

At the time fossils are discovered, they have already been subjected to a variety of destructive processes, including a combination of predation, scavenging, disarticulation, transport, and weathering. For each alternative in this EIS, surface disturbance in sensitive areas and increased access to paleontological resources through an expanded road network could exacerbate the destruction of paleontological resources that can result in unavoidable adverse impacts.

These natural processes and human-induced actions would occur to some extent regardless of mitigation, as described above. It is difficult to quantify the impacts to paleontological resources, measure the effectiveness of mitigation outlined above, and determine unavoidable adverse impacts for paleontological resources because fossils are likely to have been damaged by natural processes prior to their discovery. Fossils can be further damaged by construction activities that reveal their presence. Moreover, exact fossil numbers are impossible to quantify and there is no way to ascertain how many fossils existed at a specific site or within the MBPA prior to construction.

Measurable performance standards in paleontology would ensure that fossil sites are documented thoroughly and accurately and that fossils are collected according to professional paleontological

standards. Thus, implementation of ACEPMs detailed in **Section 2.2.12.2** and the recommended monitoring and mitigation procedures would reduce, but not totally negate, unavoidable adverse impacts to paleontological resources.

### 4.4.4 Irretrievable and Irreversible Commitments of Resources

All direct and indirect adverse impacts would be considered long-term; once fossils are damaged or destroyed, they can never be regenerated or replaced. All commitments of resources therefore would be irreversible.

### 4.4.5 Relationship of Short-Term Uses to Long-Term Productivity

Implementation of mitigation measures would reduce, but not completely eliminate, impacts to long-term paleontological resources resulting from short-term oil and gas development. Short-term oil and gas development, therefore, would impact long-term paleontological resources through the destruction of these resources during ground-disturbing activities.

## 4.5 SOILS

All of the alternatives would impact soil resources within the MBPA through surface disturbance associated with road building, pipeline and ancillary facility construction, well drilling, and well-pad development. These activities would impact soils to varying degrees (depending on the amount), placement and type of surface disturbance, the disturbed soil's characteristics; and the surface hydrology.

Soils in the MBPA, as described in **Section 3.5.1**, are generally rated low in reclamation potential. Impacts to soils are typically described in terms of short-term (or initial) and long-term (or residual) impacts. In disturbed areas where interim reclamation is implemented, ground cover by herbaceous species could potentially re-establish within 3 to 5 years following seeding of native plant species and diligent weed control efforts, consequently reducing soil erosion. These reclaimed areas have often been referred to as short-term disturbances. However, it is important to note that all surface disturbances could remain as long-term (or even permanent) impacts on the landscape if reclamation efforts are not successful.

### 4.5.1 Direct and Indirect Effects

#### 4.5.1.1 Alternative A – Proposed Action

Construction and operation of the proposed project under the Proposed Action would result in short- and long-term impacts to soils within the MBPA. Impacts would result from the clearing of vegetation, as well as excavation, salvage, stockpiling, and redistribution of soils during construction and reclamation activities associated with well pad sites, access roads, and other proposed project facilities.

Blading or excavation to achieve desired grades could result in slope steepening of exposed soils in cut and fill areas, mixing of topsoil and subsoil materials, and the breakdown of soil aggregates into loose particles. Soil structural aggregates would also be broken down by compaction from vehicular traffic. Removal and stockpiling of topsoil for revegetation purposes could reduce the natural fertility of the soil and cause a loss of soil profiles by mixing soil horizons and subsequent breakdown in soil structure.

Implementation of the Proposed Action would result in the direct disturbance of approximately 16,129 acres of soils within the MBPA**.** Following construction, approximately 8,321 acres of initial disturbance (52 percent) associated with construction of proposed well pads, portions of the access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of the Proposed Action to approximately 7,808 acres. **Table 4.5.1.1-1** provides a summary of short- and long-term surface disturbances associated with each soil mapping unit on lands in the MBPA that would be disturbed under the Proposed Action. Approximately 90 percent of the proposed surface disturbance under the Proposed Action would occur on soils that have a low restoration potential rating.

**Table 4.5.1.1-1. Summary of Soil Disturbance by Soil Type for the Proposed Action**

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| Badland-Rock outcrop complex, 1 to 100 percent slopes (12) | 375 | 175 | Not Rated |
| Boreham loam, 0 to 2 percent slopes (27) | 1,800 | 886 | Low |
| Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2) | 361 | 141 | Not Rated |
| Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38) | 983 | 503 | Low |
| Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36) | 2 | 1 | Low |
| Cakehill sandy loam, 2 to 5 percent slopes (41) | 253 | 128 | Low |
| Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL) | 74 | 35 | Low |
| Ioka-Cadrina complex, 2 to 25percent slopes (115) | 178 | 78 | Low |
| Ioka very gravelly sandy loam, 0 to 3 percent slopes (113) | 33 | 12 | Low |
| Ioka very gravelly sandy loam, 4 to 25 percent slopes (114) | 224 | 139 | Low |
| Jenrid-Green River Complex, 0 to 2 percent slopes (122) | 44 | 13 | Low |
| Jenrid sandy loam, 0 to 2 percent slopes (120) | 175 | 88 | Low |
| Kilroy loam, 1 to 4 percent slopes (123) | 1,054 | 590 | Low |
| Leebench sandy loam, 0 to 2 percent slopes (128) | 359 | 166 | Low |
| Leeko loam, 0 to 4 percent slopes (129) | 195 | 89 | Low |
| Mikim loam, 2 to 5 percent slopes (MaB) | 35 | 53 | Moderate |
| Mikim silt loam, 2 to 4 percent slopes (138) | 3 | 2 | Low |
| Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153) | 287 | 151 | Low |
| Motto-Rock outcrop complex, 2 to 25 percent slopes (154) | 2,430 | 987 | Low |
| Motto-Uffens complex, 2 to 25 percent slopes (155) | 163 | 67 | Low |
| Muff gravelly sandy loam, 2 to 8 percent slopes (158) | 602 | 247 | Low |
| Nakoy loamy fine sand, 1 to 5 percent slopes (160) | 191 | 94 | Low |
| Pariette gravelly sandy loam, 2 to 8 percent slopes (173) | 624 | 305 | Low |

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| Pherson-Hickerson complex, 1 to 8 percent slopes (179) | 68 | 32 | Low |
| Rock outcrop (193) | 5 | 2 | Not Rated |
| Shotnick sandy loam, 2 to 4 percent slopes (206) | 41 | 25 | Low |
| Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142) | 456 | 264 | Moderate |
| Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2) | 204 | 94 | Not Rated |
| Uffens loam, 3 to 8 percent slopes (249) | 954 | 487 | Low |
| Uffens sandy loam, 0 to 2 percent slopes (250) | 262 | 126 | Low |
| Umbo silty clay loam, 0 to 2 percent slopes (252) | 123 | 59 | Low |
| Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264) | 356 | 182 | Low |
| Walknolls-Uendal association, 2 to 25 percent slopes (266) | 2,493 | 1,262 | Low |
| Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256) | 495 | 232 | Low |
| Water (258) | 8 | 5 | Not Rated |
| Undocumented | 220 | 90 | Not Rated |
| **Totals** | **16,129** | **7,808** | **--** |

#### 4.5.1.1.1 Erosion and Sedimentation

Soils would also be susceptible to increased erosion in newly disturbed areas. The removal of vegetative cover, steepening of slopes, and the breakdown of aggregates as a result of the construction of roads, well pads, and other project facilities would increase the potential for channelized runoff and accelerated soil erosion. Typically, well-pad construction results in a cut slope, a level well pad, and a fill slope. Cut slopes would typically be bare of vegetation and steeper than the surrounding slope, increasing the rate of sedimentation. The sediment from the cut slopes would be deposited on the well-pad site. Because they are typically steeper, less consolidated, and devoid of vegetation, fill slopes would also increase the amount of sedimentation; that is, their sediment being delivered to the area adjacent to the fill slopes.

The removal of 16,129 acres of vegetation under the Proposed Action would increase the potential for channelized runoff and accelerated erosion to occur, with a corresponding increase in rill and gully erosion where disturbance occurs on steeper slopes and drainages. Erosion would be particularly evident if project related activities are conducted during periods of high precipitation. The increased erosion of soils could potentially lead to increased loss of vegetative cover and increased sedimentation in ephemeral drainages, Pariette Draw, the Green River, and/or other unnamed drainages. The actual amount of additional sedimentation that would reach the drainages with the MBPA would depend on the effectiveness of reclamation and erosion control measures as well as natural factors including the water available for overland flow; the texture of the eroded material, the amount and kind of ground cover; the shape, gradient, and length of the slope; and surface roughness (Barfield et al. 1981). Wind erosion could also increase with removal of vegetation and exposure of soils.

In order to estimate potential erosion and sediment yield increases associated with the Proposed Action and alternatives, the Water Erosion Prediction Project (WEPP) Roads (WEPP:Road) model developed by the USFS was used to predict erosion rates and sediment yields from roads (USFS 2000), and the Revised Universal Soil Loss Equation (RUSLE2) model developed by the U.S. Department of Agriculture (USDA) - Agricultural Research Service was used to predict erosion rates and sediment yields from well pads and other facilities (USDA 2005). **Appendix F** describes the WEPP:Road and RUSLE2 models as well as the assumptions and methods used to estimate the additional erosion that would be generated by the implementation of the Proposed Action and alternatives. Data such as precipitation, soil type, topography, land cover, and BMPs were used for soil modeling using the RUSLE2 and WEPP:Road models.

Erosion calculations were performed for both the construction and development, and production phases of the Project. New roads and upgrades to existing roads were modeled separately from well pad and other facility construction so that a direct comparison could be made between the amount of erosion that would occur from road construction under the alternatives, and the amount of erosion that would occur from the construction of well pads and other non-linear facilities.

Based on the model results, an estimated 235 tons of soil would be eroded annually in the short-term (about 1 to 7 years) under the Proposed Action (see **Table 4.5.1.1.1-1**). This includes approximately 5 tons generated from the construction of well pads and other facilities and 230 tons generated from road and pipeline construction, which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would be an estimated 254 tons per year, which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year.

**Table 4.5.1.1.1-1. Total Estimated Annual Soil Erosion Under the Proposed Action**

| Erosion Source | Existing Erosion (tons/year) | Construction and Development Phase[1] (tons/year) | Production Phase[2] (tons/year) |
|---|---|---|---|
| Well Pads | --* | 3.9 | --* |
| Access Roads and Pipelines[3] | 183 | 230 | 254 |
| Other Facilities | --* | 0.7 | --* |
| **Total Project Contribution** | **--** | **235** | **254** |
| Natural Sources (background) | 204,734 | 204,734 | 204,734 |
| **Annual Total for MBPA** | **204,917** | **204,969** | **204,988** |
| ***Percent Increase from Project*** | **--** | **0.1** | **0.1** |

*Surfaces would be either reclaimed, covered with gravel or surface hardened which would result in negligible amounts of soil erosion.

[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 16-year well drilling phase and upon completion of interim reclamation.

[2]The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.

[3]For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.

Source Note: Summations may not total precisely due to rounding.

Most of the erosion and sediment associated with well pads and other facilities would occur during the early stages of construction and operation of the facilities prior to interim reclamation. The majority of the sediment created from the proposed well pads and other project facilities is expected to be deposited onto adjacent undisturbed areas, and only a fraction of this total would be delivered to area drainages. Once well pads and other facilities are constructed, they would be surfaced with gravel, which would result in a substantial decrease in the rate of sedimentation that is expected to be negligible over the long-term (see **Table 4.5.1.1.1-1)**. It is expected that following construction activities, re-vegetation, and five to seven growing seasons, erosion and sedimentation rates would decrease to near baseline conditions for well pads and other facilities. This is supported by a study conducted by Swift (1984) that showed placement of gravel on a disturbed surface reduced sediment production from 70 to 92 percent (depending on the thickness of the gravel layer used) from unsurfaced conditions over a 5-month period.

The greatest contribution to erosion and sedimentation rates under the Proposed Action would come from the construction and use of access roads within the MBPA. Erosion and sedimentation rates would be expected to remain at elevated levels for the access roads over the LOP, even in the absence of high traffic volumes. Unlike well pad sites and other facilities, access roads are located in areas with steeper slopes that would result in increased runoff velocity, which in turn, increases erosion and off-site sedimentation. Access roads also parallel or intersect drainages which would increase the efficiency and rate at which sediment is delivered to area drainages. This is supported by the fact that of the estimated 243 miles of new roads proposed to be constructed under the Proposed Action, there are approximately 953 locations where these roads cross or insect an ephemeral drainage. Because erosion and sedimentation rates for access roads constructed over the LOP are not directly additive for each subsequent year of new road construction, all erosion and sedimentation associated with construction of

approximately 243 miles of new roads under the Proposed Action were calculated up front. For purposes of analysis, it was assumed that all of the roads would be constructed during the first year of the Project, when in fact they would actually be constructed over a 16-year period (see **Table 4.5.1.1.1-1**).

Of the estimated annual erosion of 235 tons associated with the Proposed Action, about 26 percent of this amount (62 tons) would be delivered to the network of ephemeral drainages within the MBPA. Once delivered to an ephemeral drainage, the sediment would then be available for transport. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

The proposed mitigation measures described in **Section 4.5.2** would be implemented during construction to avoid or minimize soil erosion and off-site deposition. Based on these measures and implementation of ACEPMs, there would be limited adverse impacts on soil resources as a result of implementation of the Proposed Action.

#### 4.5.1.1.2 Soil Contamination

Sources of potential soil contamination include leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks. To reduce the potential for hydrocarbon contamination of soils, gas lines and water lines would be designed to minimize the potential for spills and leaks. Storage tanks would be surrounded by berms capable of holding at least 110 percent of the largest single tank volume. Leaks or spills of saline water, hydrofracturing chemicals, fuels, and lubricants could also result in soil contamination. Depending on the size and type of spill, the effect on soils would primarily consist of the potential loss of soil productivity. Implementation of the project SPCC plan would minimize the risk of such spills by providing safeguards against spills and detailing reporting and cleanup measures to be taken in the event of a spill. Thus, the potential for impacts to soils from spills is considered to be minor.

#### 4.5.1.1.3 Destruction of Biological Soil Crusts

Mapping of BSCs has not been performed in the MBPA. However, based upon the physical and biological characteristics of the existing soils, BSCs could occur. BSCs are commonly associated with pinyon-juniper woodlands and sagebrush communities, both of which would be disturbed under the Proposed Action. BSCs are vulnerable to vehicle traffic, livestock grazing, and pedestrian traffic. The fibers that compose the tensile strength of BSCs are weak in comparison to the compressional strength placed on the crusts by machinery, human footprints, big game, and livestock. The impact of a given surface disturbance on BSCs depends upon its severity, frequency, timing, and type, as well as the weather conditions during and after the disturbance (Belnap et al. 2001). Biological soil crusts occurring in the MBPA have been largely disturbed by previous oil and gas development as well as livestock grazing. Surface disturbances associated with the Proposed Action could add to these disturbances by breaking, overturning, and burying soil crusts to various degrees (Belnap et al. 2001).

### 4.5.1.2 Alternative B - No Action Alternative

The nature and scope of direct and indirect impacts to soils under the No Action Alternative would be similar to those for the Proposed Action, but of less magnitude. Under the No Action Alternative, Newfield would continue to construct roads, well pads, and ancillary facilities to complete up to 788

wells, including those proposed on State and private lands or minerals, as well as those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS.

Approximately 870 acres of soil would initially be disturbed during the construction of the No Action Alternative, prior to interim reclamation. This represents approximately 0.7 percent of the total 119,743 acres within the MBPA. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within three to four growing seasons following completion of the respective project facility. What remains after successful interim reclamation would be a long-term disturbance of approximately 659 acres, or 0.6 percent of the MBPA for the estimated 28-to 38-year LOP.

**Table 4.5.1.2-1** below provides the amount of short- and long-term surface disturbance for each of the soil map units within the MBPA that would be disturbed under Alternative B. For Alternative B, approximately 92 percent of the surface disturbance would occur on soils that have a low restoration potential rating.

**Table 4.5.1.2-1. Summary of Soil Disturbance by Soil Type for Alternative B – No Action**

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| Badland-Rock outcrop complex, 1 to 100 percent slopes (12) | 14 | 11 | Not Rated |
| Boreham loam, 0 to 2 percent slopes (27) | 156 | 112 | Low |
| Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2) | 3 | 3 | Not Rated |
| Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38) | 88 | 65 | Low |
| Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36) | -- | 0 | Low |
| Cakehill sandy loam, 2 to 5 percent slopes (41) | 3 | 3 | Low |
| Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL) | 13 | 8 | Low |
| Ioka-Cadrina complex, 2 to 25percent slopes (115) | 8 | 5 | Low |
| Ioka very gravelly sandy loam, 0 to 3 percent slopes (113) | -- | 0 | Low |
| Ioka very gravelly sandy loam, 4 to 25 percent slopes (114) | 10 | 6 | Low |
| Jenrid-Green River Complex, 0 to 2 percent slopes (122) | -- | 0 | Low |
| Jenrid sandy loam, 0 to 2 percent slopes (120) | 2 | 2 | Low |
| Kilroy loam, 1 to 4 percent slopes (123) | 73 | 55 | Low |
| Leebench sandy loam, 0 to 2 percent slopes (128) | 26 | 18 | Low |
| Leeko loam, 0 to 4 percent slopes (129) | 1 | 1 | Low |
| Mikim loam, 2 to 5 percent slopes (MaB) | 6 | 4 | Moderate |
| Mikim silt loam, 2 to 4 percent slopes (138) | -- | 0 | Low |
| Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153) | 13 | 13 | Low |
| Motto-Rock outcrop complex, 2 to 25 percent slopes | 103 | 81 | Low |

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| (154) | | | |
| Motto-Uffens complex, 2 to 25 percent slopes (155) | 2 | 2 | Low |
| Muff gravelly sandy loam, 2 to 8 percent slopes (158) | 20 | 17 | Low |
| Nakoy loamy fine sand, 1 to 5 percent slopes (160) | 6 | 6 | Low |
| Pariette gravelly sandy loam, 2 to 8 percent slopes (173) | 42 | 39 | Low |
| Pherson-Hickerson complex, 1 to 8 percent slopes (179) | 2 | 1 | Low |
| Rock outcrop (193) | -- | 0 | Not Rated |
| Shotnick sandy loam, 2 to 4 percent slopes (206) | -- | 0 | Low |
| Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142) | 28 | 20 | Moderate |
| Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2) | 14 | 12 | Not Rated |
| Uffens loam, 3 to 8 percent slopes (249) | 6 | 5 | Low |
| Uffens sandy loam, 0 to 2 percent slopes (250) | 4 | 4 | Low |
| Umbo silty clay loam, 0 to 2 percent slopes (252) | 19 | 14 | Low |
| Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264) | 41 | 29 | Low |
| Walknolls-Uendal association, 2 to 25 percent slopes (266) | 127 | 97 | Low |
| Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256) | 38 | 25 | Low |
| Water (258) | -- | 0 | Not Rated |
| Unclassified | 1 | 1 | Not Rated |
| **Total** | **870** | **659** | **--** |

#### 4.5.1.2.1 Erosion and Sediment Yield

Impacts from erosion and sedimentation under the No Action Alternative would be similar in nature and scope to those described for the Proposed Action. However, potential impacts would be considerably less under the No Action Alternative, as only 788 new oil and gas wells, 23 miles of new roads, and seven facilities would be developed on BLM, State and private lands in the MBPA. The overall surface disturbance would be approximately 870 acres, which is 95 percent less than the Proposed Action.

Under the No Action Alternative, an estimated 173 tons of soil would be eroded annually in the short-term (about 1 to 7 years) (see **Table 4.5.1.2.1-1**). This includes less than 0.5 ton per year generated from the construction of well pads and other facilities and 173 tons generated from road and pipeline construction, which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would decrease to an estimated 189 tons per year, which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year.

Of the estimated annual erosion of 173 tons of soil associated with the No Action Alternative, about 28 percent of this amount (49 tons) would be delivered to the network of ephemeral drainages within the MBPA. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

**Table 4.5.1.2.1-1. Total Estimated Annual Soil Erosion under Alternative B - No Action Alternative**

| Erosion Source | Existing Erosion (tons/year) | Construction and Development Phase[1] (tons/year) | Production Phase[2] (tons/year) |
|---|---|---|---|
| Well Pads | --* | 0.4 | --* |
| Access Roads and Pipelines[3] | 183 | 173 | 189 |
| Other Facilities | --* | 0.08 | --* |
| **Total Project Contribution** | **--** | **173** | **189** |
| Natural Sources (background) | 204,734 | 204,734 | 204,734 |
| **Annual Total for MBPA** | **204,917** | **204,907** | **204,923** |
| ***Percent Increase from Project*** | **--** | **0.1** | **0.1** |

*Surfaces would be either reclaimed, covered with gravel or surface hardened which would result in negligible amounts of soil erosion.

[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 2.2-year well drilling phase and upon completion of interim reclamation.

[2]The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.

[3]For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.

Source Note: Summations may not total precisely due to rounding.

### 4.5.1.2.2 Soil Contamination and Biological Soil Crusts

Because the distribution of BSCs within the MBPA is unknown, a decrease in surface disturbance is assumed to correspond to a similar decrease in impacts to soil crusts. Under the No Action, the overall surface disturbance would be approximately 870 acres, which is 95 percent less than the Proposed Action. This alternative would therefore have the least risk of impacting BSCs of any alternative because the smallest areas of vegetation communities associated with soil crusts would be disturbed.

Correspondingly the potential for soil contamination from leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks, would be proportionally less than that of the Proposed Action and would be the lowest of all alternatives considered. For the same reasons as previously described under the Proposed Action, the potential for impacts to soils from spills is considered to be minor.

### 4.5.1.3 Alternative C – Field-Wide Electrification

Direct and indirect impacts to soils under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. Approximately 16,308 acres of soil would initially be disturbed during the construction of Alternative C, prior to interim reclamation. This represents approximately 13.6 percent of the total 119,743 acres within the MBPA. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within three to four growing seasons following completion of the respective project facility. What remains after successful interim reclamation would be a "long-term" disturbance of approximately 7,925 acres, or 7 percent of the MBPA for the estimated 41-to 51-year LOP. **Table 4.5.1.3-1** provides the amount of short- and long-term surface disturbance for each of the soil map units within the MBPA that would be disturbed under Alternative C. For Alternative C, approximately 90 percent of the surface disturbance would occur on soils that have a low restoration potential rating.

**Table 4.5.1.3-1. Summary of Soil Disturbance by Soil Type for Alternative C – Field-Wide Electrification**

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| Badland-Rock outcrop complex, 1 to 100 percent slopes (12) | 378 | 176 | Not Rated |
| Boreham loam, 0 to 2 percent slopes (27) | 1,838 | 916 | Low |
| Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2) | 363 | 142 | Not Rated |
| Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38) | 986 | 505 | Low |
| Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36) | 2 | 1 | Low |
| Cakehill sandy loam, 2 to 5 percent slopes (41) | 258 | 131 | Low |
| Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL) | 74 | 35 | Low |
| Ioka-Cadrina complex, 2 to 25percent slopes (115) | 181 | 81 | Low |
| Ioka very gravelly sandy loam, 0 to 3 percent slopes (113) | 33 | 12 | Low |
| Ioka very gravelly sandy loam, 4 to 25 percent slopes (114) | 226 | 140 | Low |
| Jenrid-Green River Complex, 0 to 2 percent slopes (122) | 44 | 13 | Low |
| Jenrid sandy loam, 0 to 2 percent slopes (120) | 177 | 89 | Low |
| Kilroy loam, 1 to 4 percent slopes (123) | 1,067 | 600 | Low |
| Leebench sandy loam, 0 to 2 percent slopes (128) | 359 | 166 | Low |
| Leeko loam, 0 to 4 percent slopes (129) | 197 | 91 | Low |
| Mikim loam, 2 to 5 percent slopes (MaB) | 68 | 56 | Moderate |
| Mikim silt loam, 2 to 4 percent slopes (138) | 3 | 2 | Low |
| Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153) | 295 | 158 | Low |
| Motto-Rock outcrop complex, 2 to 25 percent | 2,445 | 1,000 | Low |

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| slopes (154) | | | |
| Motto-Uffens complex, 2 to 25 percent slopes (155) | 163 | 67 | Low |
| Muff gravelly sandy loam, 2 to 8 percent slopes (158) | 602 | 247 | Low |
| Nakoy loamy fine sand, 1 to 5 percent slopes (160) | 194 | 96 | Low |
| Pariette gravelly sandy loam, 2 to 8 percent slopes (173) | 625 | 306 | Low |
| Pherson-Hickerson complex, 1 to 8 percent slopes (179) | 68 | 32 | Low |
| Rock outcrop (193) | 5 | 2 | Not Rated |
| Shotnick sandy loam, 2 to 4 percent slopes (206) | 45 | 28 | Low |
| Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142) | 462 | 269 | Moderate |
| Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2) | 206 | 96 | Not Rated |
| Uffens loam, 3 to 8 percent slopes (249) | 960 | 492 | Low |
| Uffens sandy loam, 0 to 2 percent slopes (250) | 264 | 128 | Low |
| Umbo silty clay loam, 0 to 2 percent slopes (252) | 125 | 60 | Low |
| Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264) | 361 | 186 | Low |
| Walknolls-Uendal association, 2 to 25 percent slopes (266) | 2,507 | 1,273 | Low |
| Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256) | 495 | 232 | Low |
| Water (258) | 8 | 5 | Not Rated |
| Undocumented | 223 | 93 | Not Rated |
| **Total** | **16,308** | **7,925** | **--** |

#### 4.5.1.3.1 Erosion and Sediment Yield

Impacts from erosion and sedimentation under Alternative C would be nearly identical to those described for the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. The overall surface disturbance would be approximately 16,308 acres, which is 1 percent greater than that of the Proposed Action.

Under Alternative C, an estimated 235 tons of soil would be eroded annually in the short-term (about 1 to 7 years) (see **Table 4.5.1.3.1-1**). This includes approximately 5 tons generated from the construction of well pads and other facilities and 230 tons generated from road and pipeline construction, which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would be an estimated 254 tons per year which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year.

Of the estimated annual erosion of 235 tons associated with Alternative C, about 26 percent of this amount (62 tons) would be delivered to the network of ephemeral drainages within the MBPA. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

**Table 4.5.1.3.1-1. Total Estimated Annual Soil Erosion under Alternative C**

| Erosion Source | Existing Erosion (tons/year) | Construction and Development Phase[1] (tons/year) | Production Phase[2] (tons/year) |
|---|---|---|---|
| Well Pads | --* | 3.9 | --* |
| Access Roads and Pipelines[3] | 183 | 230 | 254 |
| Other Facilities | --* | 0.8 | --* |
| **Total Project Contribution** | **--** | **235** | **254** |
| Non Anthropogenic Sources (background) | 204,734 | 204,734 | 204,734 |
| **Annual Total for MBPA** | **204,917** | **204,969** | **204,988** |
| ***Percent Increase from Project*** | **--** | **0.1** | **0.1** |

*Surfaces would be either reclaimed, covered with gravel or surface hardened which would result in negligible amounts of soil erosion.

[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 16-year well drilling phase and upon completion of interim reclamation.

[2]The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.

[3]For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.

Source Note: Summations may not total precisely due to rounding.

### 4.5.1.3.2 Soil Contamination and Biological Soil Crusts

Because the distribution of BSCs within the MBPA is unknown, an increase in surface disturbance is assumed to correspond to a similar increase in impacts to soil crusts. Under Alternative C, the overall surface disturbance would be approximately 16,308 acres, which is one (1) percent more than the Proposed Action. This alternative would therefore have the greatest potential for impacts to BSCs of any alternative.

Correspondingly the potential for soil contamination from leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks, would be identical to that of the Proposed Action because an identical number of wells would be drilled (5,750) and associated project facilities would be constructed. For the same reasons as previously described under the Proposed Action, the potential for impacts to soils from spills is considered to be minor.

#### 4.5.1.4 Alternative D – Resource Protection Alternative

Impacts to soils under the Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D because 692 fewer oil and gas wells would be drilled; fewer new well pads would be constructed; many of the well pads that are constructed would be precluded from sensitive areas; and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology.

Approximately 9,805 acres of soil would initially be disturbed under implementation of Alternative D, which is 61 percent less than that under the Proposed Action. This represents approximately 8 percent of the total 119,743 acres within the MBPA. Those portions of the well pads, access road ROWs, pipeline ROWs, and other facilities not needed for production operations would be reclaimed within three to four growing seasons following completion of the respective project facility. Approximately 6,987 acres of initial disturbance (71 percent) associated with construction of proposed well pads, road and pipeline ROWs, and other project facilities not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with implementation of Alternative D to approximately 2,818 acres, which is the lowest among all the action alternatives considered.

**Table 4.5.1.4-1** below provides the amount of short- and long-term surface disturbance for each of the soil map units within the MBPA that would be disturbed under the Alternative D. For Alternative D, approximately 89 percent of the surface disturbance would occur on soils that have a low restoration potential rating.

**Table 4.5.1.4-1. Summary of Soil Disturbance by Soil Type for Alternative D – Resource Protection Alternative**

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| Badland-Rock outcrop complex, 1 to 100 percent slopes (12) | 161 | 34 | Not Rated |
| Boreham loam, 0 to 2 percent slopes (27) | 1,133 | 353 | Low |
| Braf-Rock outcrop-Uffens complex, 5 to 50 percent slopes (EZF2) | 281 | 62 | Not Rated |
| Cadrina-Casmos-Rock outcrop complex, 2 to 40 percent slopes (38) | 683 | 198 | Low |
| Cadrina extremely stony loam-Rock outcrop complex, 25 to 50 percent slopes (36) | 2 | 1 | Low |
| Cakehill sandy loam, 2 to 5 percent slopes (41) | 163 | 57 | Low |
| Cheeta-Rock outcrop complex, 30 to 80 percent slopes (RAL) | 21 | 9 | Low |
| Ioka-Cadrina complex, 2 to 25percent slopes (115) | 125 | 35 | Low |
| Ioka gravelly sandy loam, 0 to 3 percent slopes (113) | 26 | 7 | Low |
| Ioka very gravelly sandy loam, 4 to 25 percent slopes (114) | 96 | 32 | Low |
| Jenrid-Green River complex, 0 to 2 percent slopes (122) | 7 | - | Low |
| Jenrid sandy loam, 0 to 2 percent slopes (120) | 91 | 29 | Low |

| Soil Map Unit | Short-Term Disturbance (Acres) | Long-Term Disturbance (Acres) | Restoration Potential Rating |
|---|---|---|---|
| Kilroy loam, 1 to 4 percent slopes (123) | 636 | 206 | Low |
| Leebench sandy loam, 0 to 2 percent slopes (128) | 151 | 44 | Low |
| Leeko loam, 0 to 4 percent slopes (129) | 114 | 31 | Low |
| Mikim loam, 2 to 5 percent slopes (MaB) | 56 | 29 | Moderate |
| Mikim silt loam, 2 to 4 percent slopes (138) | - | - | Low |
| Motto-Muff-Rock Outcrop complex, 2 to 25 percent slopes (153) | 209 | 83 | Low |
| Motto-Rock outcrop complex, 2 to 25 percent slopes (154) | 1,374 | 334 | Low |
| Motto-Uffens complex, 2 to 25 percent slopes (155) | 129 | 25 | Low |
| Muff gravelly sandy loam, 2 to 8 percent slopes (158) | 344 | 96 | Low |
| Nakoy loamy fine sand, 1 to 5 percent slopes (160) | 77 | 24 | Low |
| Pariette gravelly sandy loam, 2 to 8 percent slopes (173) | 458 | 132 | Low |
| Pherson-Hickerson complex, 1 to 8 percent slopes (179) | 29 | 6 | Low |
| Rock outcrop (193) | 4 | 1 | Not Rated |
| Shotnick sandy loam, 2 to 4 percent slopes (206) | 15 | 4 | Low |
| Smithpond-Montwel-Badland association, 3 to 25 percent slopes (142) | 277 | 93 | Moderate |
| Uffens-Rock Outcrop complex, 15 to 25 percent slopes (CZE2) | 124 | 29 | Not Rated |
| Uffens loam, 3 to 8 percent slopes (249) | 386 | 123 | Low |
| Uffens sandy loam, 0 to 2 percent slopes (250) | 158 | 39 | Low |
| Umbo silty clay loam, 0 to 2 percent slopes (252) | 31 | 7 | Low |
| Walknolls-Rock outcrop complex, 2 to 50 percent slopes (264) | 220 | 71 | Low |
| Walknolls-Uendal association, 2 to 25 percent slopes (266) | 1,750 | 493 | Low |
| Walknolls extremely channery sandy loam, 4 to 25 percent slopes (256) | 290 | 85 | Low |
| Water (258) | - | - | Not Rated |
| Unclassified | 180 | 46 | Not Rated |
| **Total** | **9,805** | **2,818** | **--** |

#### 4.5.1.4.1 Erosion and Sediment Yield

Impacts to soils from increased erosion and sedimentation under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be less under the Alternative D due to the substantial decrease in the amount of short- and long-term surface disturbance as compared to that of the Proposed Action.

Under the Alternative D, an estimated 191 tons of soil would be eroded annually in the short-term (about 1 to 7 years) (see **Table 4.5.1.4.1-1**). This includes approximately 1.1 tons generated from the

construction of well pads and other facilities and 190 tons generated from road and pipeline construction, which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year. Over the long term (8 to 20 years), the estimated additional erosion from road construction and the construction of well pads and other facilities would be an estimated 205 tons per year, which collectively constitutes a 0.1 percent increase over the current estimated background erosion rate of 204,734 tons per year.

Of the estimated annual erosion of 191 tons associated with Alternative D, about 29 percent of this amount (56 tons) would be delivered to the network of ephemeral drainages within the MBPA. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. A more detailed discussion of sedimentation is provided under **Section 4.6.1.1.1.4**, *Surface Water Resources*.

**Table 4.5.1.4.1-1. Total Estimated Annual Soil Erosion under Alternative D - Resource Protection Alternative**

| Erosion Source | Existing Erosion (tons/year) | Construction and Development Phase[1] (tons/year) | Production Phase[2] (tons/year) |
|---|---|---|---|
| Well Pads | --* | 0.6 | --* |
| Access Roads and Pipelines[3] | 183 | 190 | 205 |
| Other Facilities | --* | 0.5 | --* |
| **Total Project Contribution** | **--** | **191** | **205** |
| Natural Sources (background) | 204,734 | 204,734 | 204,734 |
| **Annual Total for MBPA** | **204,917** | **204,925** | **204,939** |
| ***Percent Increase from Project*** | **--** | **0.1** | **0.1** |

*Surfaces would be either reclaimed, covered with gravel or surface hardened which would result in negligible amounts of soil erosion.
[1] Construction and development would involve well drilling, pad development and completion activities and would be complete following the 14-year well drilling phase and upon completion of interim reclamation.
[2]The production phase would be initiated following interim reclamation, would include the remaining LOP, and would be completed following successful final reclamation.
[3]For purposes of analysis, it is assumed that all access roads and pipelines would be constructed within the first year; therefore, the value in tons/year for the construction and development phase is equal to the total amount of soil eroded for the entire project phase.
Source Note: Summations may not total precisely due to rounding.

### 4.5.1.4.2 Soil Contamination and Biological Soil Crusts

Because the distribution of BSCs within the MBPA is unknown, a decrease in surface disturbance is assumed to correspond to a similar decrease in impacts to soil crusts. Under the Alternative D, the overall surface disturbance would be approximately 9,805 acres, which is 61 percent less than the Proposed Action. This alternative would therefore have the lower risk of impacting BSCs than any of the action alternatives considered because the smallest areas of vegetation communities associated with soil crusts would be disturbed.

Correspondingly the potential for soil contamination from leaks or spills of natural gas condensate liquids from wellheads, gas and water lines, produced water sumps, and condensate storage tanks, would be proportionally less than that of the Proposed Action and would be the lowest of all action alternatives considered. For the same reasons as previously described under the Proposed Action, the potential for impacts to soils from spills is considered to be minor.

### 4.5.2 Mitigation

In addition to the ACEPMs detailed in **Section 2.2.12.3**, mitigation measures could be used to lessen impacts caused to soils, reduce expected increases in erosion rates and sediment yields, and negate impacts to watershed and floodplain resources. Proposed measures include:

- No surface disturbance would occur on slopes between 40 percent and 60 percent. If it is not feasible to avoid these slopes, then the applicant would provide the AO with an erosion control plan, a road maintenance plan, and an engineered drawing of the proposed road. Approval from the AO would be required for all proposed roads traversing slopes between 40 percent and 60 percent.
- Surface disturbance would be minimized on slopes between 21 and 40 percent.
- Well pads would not be located in active drainages.
- To the fullest extent possible, access roads proposed in valley/drainage bottoms would be sited on the toe of the adjacent slope to the valley bottom. Roads would have appropriate energy dissipaters (e.g., water bars and silt fences) where water leaves the road and is routed toward an adjacent drainage.
- Well pads adjacent to drainages would be bermed to prevent runoff from entering the drainage.
- As conditions dictate, and as determined by the AO, diversion ditches would be constructed around the pad.
- Where diversion ditches are constructed to reroute drainages around well pads, ditches would be designed to return the diverted water back to the original channel. If it is not feasible to return diverted water back to its original channel, the water would be diverted to the nearest channel, with energy-dissipating devices installed to prevent channel degradation.
- The presence of BSCs would be assessed on a site-specific basis during well pad and road development and siting. Areas with crusts would be avoided as feasible, and any unavoidable disturbance would be mitigated as necessary.
- Additional measures to ensure successful reclamation would be implemented, as determined by the AO. They consist of, but would not be limited to, hydro mulching, supplemental mycorrhizal applications, erosion blankets, spray-on fiber matrices, tackifiers, etc.
- Erosion and sedimentation would be reduced through the use of BMPs including, but not limited to, berms, sediment control structures, grading, mulching, revegetation, and interim reclamation.
- Reclamation would be performed in accordance with the Green River District Reclamation Guidelines (BLM 2009a).
- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.

- If surface-disturbing activities cannot be avoided on slopes from 21 percent to 40 percent, a plan would be required. The plan would be approved by BLM prior to construction and maintenance and include: (i) an erosion control strategy, (ii) GIS modeling, and (iii) proper survey and design by a certified engineer.

### 4.5.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts from the Proposed Action include short- and long-term soil exposure and compaction; loss of soil productivity and topsoil due to erosion and disturbance of BSCs; increased susceptibility of soil to both wind and water erosion because of a loss of stabilizing vegetative cover; and increased sediment yield due to proposed oil and gas facilities and infrastructure.

Under the Proposed Action, an estimated 254 tons of sediment (above the natural background erosion) are expected to be eventually delivered to the area drainages annually over the long-term (production phase). Alternative B, Alternative C, and Alternative D would deliver an estimated 189, 254, and 205 tons of sediment, respectively. These sediment inputs would only slightly increase the approximately 6.8 million tons per year of sediment load in the Green River estimated from USGS gage records of the Green River near Ouray, Utah.

### 4.5.4 Irretrievable and Irreversible Commitments of Resources

The activities proposed would result in short- and long-term changes to soil productivity due to surface disturbance and loss of vegetation. This loss of soil productivity would be irretrievable until restoration is complete. In some areas, soils restrict rehabilitation success. It is possible that soil in these areas would experience some irreversible impacts due to the difficulty in restoring vegetation.

### 4.5.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of oil and gas facilities and infrastructures would provide a short-term mineral use that would eventually result in long-term loss of soil productivity in localized areas impacted by development activities. Long-term impacts to soil productivity would be primarily the result of vegetation removal or prevention of revegetation that would allow continued erosion of soil. Impacts would persist until surface disturbance and vegetation loss are reclaimed.

## 4.6 WATER RESOURCES

### 4.6.1 Direct and Indirect Impacts

Potential direct and indirect impacts to surface water are:

- Depletion of water flow in the Green River due to project-related water consumption
- Water quality degradation by:
    - Increased sedimentation, turbidity, and salinity of MBPA streams as a result of additional surface disturbance and the resulting increased erosion into surface waters via runoff and the deposition of fugitive dust within streams and on rock surfaces

  - Increased sediment loading to the Green River, potentially increasing salinity levels in the Colorado River system
  - Potential contamination of surface water resources with drilling fluids, petroleum, produced water, or other chemicals used for drilling and production activities
- Erosion and sedimentation in the Waters of the U.S.

The potential for impacts would be greatest shortly after the start of construction activities and would decrease in time due to natural stabilization, reclamation, and revegetation efforts. The magnitude of these potential impacts to surface water resources would depend on several factors, including the proximity of the disturbed area to the water influence zone of ephemeral and perennial surface water drainages or ponds, slope aspect and gradient, the erosion potential of the affected soil types, the duration and timing of construction activities, and the success or failure of reclamation and mitigation measures. The water influence zone includes floodplains, zones of riparian vegetation, unstable areas, wetlands, or highly erodible soils located adjacent to a stream or other water body.

A Long-term Water Quality Monitoring Plan has been developed to monitor water resources before, during, and after development to detect impacts to surface and groundwater resources and determine whether applicable water quality standards numeric and narrative criteria are being met. The proposed Long-term Water Quality Monitoring Plan is presented in **Appendix H**.

#### 4.6.1.1 Alternative A – Proposed Action

##### 4.6.1.1.1 Water Requirements

The project is divided into three different phases – Well Drilling and Completion Phase, the Production Phase, and the Abandonment and Reclamation Phase. Each phase has its own water requirements, and each phase has water available from different sources.

###### *4.6.1.1.1.1 Well Drilling and Completion Phase*

About 0.9 acre-feet of water would be required to drill and complete each Green River oil well and about 6.2 acre-feet would be required to drill and complete each deep gas well. The total water use for drilling and completion of all Green River oil wells (3,250 wells) and deep gas wells (2,500 wells) under the Proposed Action would be about 18,425 acre-feet, or approximately 1,150 acre-feet of water annually over the 16-year drilling and completion activities period.

In addition, a total of 0.08 acre-feet of water would be needed for dust suppression at each well pad, access road, and pipeline/utility corridor during construction activities for all of the wells (5,750 wells). It is further assumed that only 10 percent of this total amount will be needed on an annual basis. This assumes that construction will occur over a 10-year period, when in fact it occurs over 16 years, which is a conservative assumption. Based on these assumptions, Newfield would need about three (3) acre-feet per year for dust suppression during well construction and completion and 46 acre-feet total.

During the Well Drilling and Completion Phase, a total of 1,153 acre-feet of water would be needed annually for well drilling and completion (1,150 acre-feet/year) and dust suppression (3 acre-feet/year). It is assumed that necessary water will be acquired from permitted surface water before permitted groundwater sources. Thus, 382 acre-feet per year (the entire available surface water supply) will be

obtained from permitted surface water sources and the remainder of the water needs (771 acre-feet/year) will be obtained from permitted groundwater sources.

#### *4.6.1.1.1.2 Production Phase*

It is assumed that about 0.13 acre-feet of water would be used annually for dust suppression per well pad, access road, and pipeline/utility corridor during the operation of the wells (5,750 wells), which will occur after well construction for 20 to 30 years. This water use applies to only 10 percent of the wells. Based on these assumptions, Newfield would use approximately 75 acre-feet of water annually for dust suppression and 1,500- to 2,250-acre-feet for the 20- to 30-year period of operation.

Water-flooding would be used at all of the proposed 40-acre spacing Green River wells (approximately 750 wells). A total of approximately 0.01 acre-feet of water would be used daily for each water-flood injection well. Based on estimated requirement of about 7.5 acre-feet per day (750 wells times 0.01 acre-feet per day), the annual water requirement for water-flooding operations would be about 2,738 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water and the remaining 50 percent would come from fresh water resources.

The annual water requirement is the sum of the dust suppression (75 acre-feet/year) and water-flooding (2,738 acre-feet/year) water demands, or 2,813 acre-feet. It is assumed that recycled produced water will constitute 50 percent of water needed for production, If each of the 5,750 wells produces (assuming 0.24 acre-feet of water can be recycled), then there would be 1,369 acre-feet of recycled water available to be used each year. The remainder of the water demand would be met by permitted surface water sources (382 acre-feet/year) and groundwater sources (about 1,063 acre-feet/year).

#### *4.6.1.1.1.3 Abandonment and Reclamation Phase*

During the Abandonment and Reclamation Phase, 75 acre-feet per year would be needed for dust suppression. Because the wells would no longer be producing by this phase, this entire need would be met from permitted surface water sources. **Table 4.6.1.1.1.3-1** shows the water requirements and source of water for Alternative A.

**Table 4.6.1.1.1.3-1. Water Requirements and Water Availability Under Alternative A – Proposed Action**

| Project Phase | Total Water Requirement (acre-feet/year) | Available Permitted Surface Water (acre-feet/year) | Available Permitted Groundwater (acre-feet/year) | Available Recycled Produced Water (acre-feet/year) | Recycled Produced Water Use (acre-feet/year) | Permitted Surface Water Use (acre-feet/year) | Permitted Groundwater Use (acre-feet/year) |
|---|---|---|---|---|---|---|---|
| Well Drilling and Completion (16 years) | 1,153 | 382 | 12,236 | 0 | 0 | 382 | 771 |
| Production (20-30 years) | 2,813 | 382 | 12,236 | 1,369 | 1,369 | 382 | 1,063 |
| Abandonment and Reclamation (5 years) | 75 | 382 | 12,236 | 0 | 0 | 75 | 0 |

### *4.6.1.1.1.4 Surface Water Resources*

Surface Water Use

Based on USGS records (USGS Site Numbers 09307000 and 09272400), the average flow in the Green River at Ouray is approximately 3,933,750 acre-feet per year. Assuming that the project's surface water needs are 382 acre-feet per year (as discussed in the previous section), the Proposed Action could potentially deplete the flow in the Green River by about 0.01 percent on an annual basis during the Well Drilling and Completion Phase and the Production Phase. During the Abandonment and Reclamation Phase, the Proposed Action would deplete the Green River by about 0.002 percent per year. Because the Green River flow is heavily regulated by releases from the Flaming Gorge Reservoir, flow in the Green River does not vary from month to month as an unregulated river would, but there is still seasonal variation. The mean monthly flow varies from a low in January of 118,000 acre-feet to a high in June of 1,012,000 acre-feet. Assuming that the water demand is constant throughout the year and factoring in a worst-case scenario because dust suppression is likely to be negligible during the winter, the water demand in January would be about 32 acre-feet of water. This would be about 0.027 percent of the flow in the Green River. Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

The USGS also has stream gages on Pariette Draw near its confluence with Green River (Site Number 09307300) and about 7.5 miles upstream of the Green River (Site Number 09307200). Based on these records, the average annual flow in the Pariette Draw at its confluence is about 16,500 acre-feet per year. The flow also varies seasonally with the lowest average monthly flow occurring in January (470 acre-feet) and the highest average monthly flow occurring in October (2,900 acre-feet). If the same assumption is made that was previously, the Proposed Action could potentially deplete the flow in Pariette Draw by about 2.3 percent on an annual basis. It can be further assumed that if the water demand is constant throughout the year and that all of the surface water flow is tributary to Pariette Draw, the water demand in January would be about 32 acre-feet of water, which would be about 6.8 percent of the flow in the Pariette Draw. In October, the water demand would be about 1.1 percent of the Pariette Draw

flow. This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet project demands and reduce any negative environmental impacts.

In addition, the stream gage measurements show that the flow in the upstream gage is actually greater than in the downstream gage, which implies that water is being diverted for other uses on Pariette Draw. The impact of the amount and location of the project's water use would need to be analyzed to estimate its effect on downstream water users.

Floodplains

Under the Proposed Action, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA. Because the pipelines will be buried in the floodplains, the project will have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that after construction the well will be flush with the ground surface, the drilling pad will be reclaimed, and there will be no storage of hydrocarbons in the floodplains.

Surface Water Quality

Accidental spillage of potentially toxic substances due to loss of containment from tanks containing glycol, fracking fluids, or petroleum products could potentially occur under the Proposed Action. An accidental spill of such substances could potentially have a negative impact on receiving waters. Contamination could occur from two mechanisms: direct spills of materials into a creek, pond, or canal, and indirect contamination of surface water due to migration of petroleum from areas of soil contamination adjacent to surface water bodies. Sources of potential direct surface water contamination include pipeline leaks and tanker truck spills at stream crossings. Sources of potential indirect surface water contamination include leaks from wellheads, gathering pipelines, produced water and condensate storage tanks, and tanker trucks. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

Spills of petroleum products, fuels, and lubricants would have the highest potential to contaminate surface waters, especially if the spills were to occur when flow was present in the ephemeral drainages of the MBPA or the spill occurred directly into a MBPA stream. Leaks of small amounts of petroleum on well pads are common occurrences; however, these small leaks generally affect relatively small areas. A traffic accident involving a tanker truck carrying condensate or produced water could lead to a larger release. Brown et al. (2001) provided release probabilities for a variety of highway bulk containers. The probability of a release of a hazardous substance during an accident was found to range from 1.0 to 6.5 percent for different container types. Therefore, using the release probabilities reported, between two and 10 significant releases of condensate or produced water from a tanker truck could be expected to occur in the MBPA during the LOP.

Specific actions under the Proposed Action could reduce or minimize impacts to surface waters related to accidental spills or loss of containment. Specifically, actions identified in the required SPCC Plans for each well site would be implemented to minimize the chance that petroleum products and other chemicals would leave the site and contaminate surface waters. If any spills were to occur, the operator would immediately contact the BLM, and any other regulatory agencies, as required by law or regulation. Strict cleanup efforts would be initiated within 24 hours.

Hydrofracturing would be conducted as part of the alternatives. Hydrofracturing is commonly used to enhance the recovery of natural gas from relatively impermeable "tight" sandstones, and involves the injection of water or other fluids, which may contain some petroleum constituents, and sand or some other "proppant" into the formation. Hydrofracturing would occur at depths that are at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from the proposed hydrofracturing is considered to be negligible.

The Lower Duchesne River Wetlands Mitigation Project lies approximately 2 miles north of the MBPA and is approximately 4,800 acres in size. Because of the small amount of water that would be used by the project and the large distance between the MBPA and the Lower Duchesne River Wetlands Mitigation Project, the proposed project should have a negligible effect on the water quality or quantity at the Wetlands Mitigation Project.

The Sand Wash Recreation Area lies approximately 9 miles south of the planning area. Because of the small amount of water used by the project and the large distance between the MBPA and the Lower Sand Wash Recreation Area, the project should have a negligible effect on the water quality or quantity at the Sand Wash Recreation Area.

*Total Maximum Daily Load Constituents of Concern*

Because selenium, boron, and salts (TDS) are found in the soil and attach themselves to soil particles, additional eroded material as a result of the Proposed Action that is conveyed to Pariette Draw will contain these constituents of concern and will increase their concentration slightly in Pariette Draw.

*Sediment, Turbidity, and Temperature*

Increased erosion and subsequent increased sedimentation of perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. The increased erosion could also potentially lead to an increase in turbidity and salinity in Pariette Draw, Gilsonite Draw, and Wells Draw, which could possibly be continued to be conveyed down to the Green River. Both of these effects could have negative impacts on aquatic habitat within affected drainages. In sufficient amounts, the eroded material from construction activities and operational facilities could:

- Degrade aquatic habitat by covering stream substrates with fine sediment and clogging the interstitial pores of the substrate
- Increase the turbidity within MBPA streams and the Green River
- Clog road culverts, which would cause runoff to flow down roads, causing more erosion and road damage
- Transport pollutants (trace metals, herbicides, petroleum constituents, and constituents of enhanced dust suppressants)
- Increase deposits in channels with subsequent decrease in the longitudinal slope and the flow carrying capacity of Pariette Draw and its tributaries, which could lead to higher water levels during flood events and more frequent flood events
- Increase salinity levels in the Green River (Colorado River system)

> **Note:** Erosion is the amount of soil that is mobilized due to wind or rain, and it is discussed fully in **Section 4.5**. The amount of sediment that could potentially reach the drainages in the MBPA depends on natural factors and the effectiveness of the erosion control measures employed. Natural factors which attenuate the transport of sediment into creeks include water available for overland flow; the texture of the eroded material; the amount and kind of ground cover; the slope shape, gradient, and length; and surface roughness (Barfield et al. 1981).

The erosion control measures employed would be of two types: non-structural controls and structural controls. Non-structural controls include proper clearing, grading, and construction practices, including surface roughening and crowning and ditching of roadways. Structural controls would be used along the proposed access roads, at drilling locations, and at other project facilities to minimize the amount of sediment that reaches any ephemeral drainage in the MBPA, where needed. The structural controls used would be specified during the APD process for each project facility.

It is assumed that the sediment load that enters the drainage ways is derived from three sources – unpaved road stream crossings, sediment eroded from disturbed areas such as well pads and associated facilities, such as buried pipelines, and general watershed erosion. The WEPP:Road computer program was used to estimate the amount of sediment entering streams at road crossings (USDA 2012). Climate information from Altamont, Utah, was used to estimate sediment yield. The roads are assumed to be in sloped with a bare ditch and erosion was assumed to occur for a distance of 300 feet in each direction of the stream crossing. During the Construction and Development Phase of the project, the roads are assumed to have "Low" use, while during the Production Phase, the dirt roads are assumed to have "No" use. The study area contains four different soil textures (clay loam, loam, sandy loam, and silt loam) and typical sediment yield estimates were obtained from a sample of sites in areas with a common soil texture. The road slope and road width were measured at these sample sites, and sediment yield quantities were estimated at each location. The sediment yield estimates for a typical road crossing were then averaged for each soil texture classification. This average sediment yield was then multiplied by the total number of road crossings in each soil texture area and each watershed to get the total estimate sediment yield in each watershed.

**Appendix F** describes the RUSLE2 model as well as the assumptions and methods used to estimate the additional erosion that would be generated by the implementation of the Proposed Action and alternatives. Data such as precipitation, soil type, topography, land cover, and BMPs were used to estimate sediment yield using the RUSLE2 model.

As previously discussed, the study area contains four different soil textures (clay loam, loam, sandy loam, and silt loam) and sediment yield was estimated from a typical well pad within each area with a common soil texture. This average sediment yield was then multiplied by the total number of well pads, expanded well pads in each soil texture area, and each watershed to calculate the total estimate sediment yield in each watershed.

To estimate general erosion from the study area, sediment yield coefficients were obtained from a literature search, and sediment yield coefficients were selected for each combination of soil erodibility (low, medium, and high) and land cover (pinyon-juniper woodland, riparian, sagebrush, desert shrub, and badlands). The sediment yield coefficients (tons/square mile/year) were then multiplied by the area of the soil erodibility and land cover areas to estimate a sediment delivery rate for each watershed.

It is assumed that no erosion and sediment control BMPs are placed on the roads at the stream crossings. While there will be erosion from roads away from the stream crossings (as discussed in **Section 4.5**), the

eroded material will be retained in the buffer between the road and stream, so there is no sediment delivery to the stream.

**Table 4.6.1.1.1.4-1** shows the estimated sediment yield in the watersheds for existing conditions. **Tables 4.6.1.1.1.4-2** and **4.6.1.1.1.4-3** provide sediment yield estimates in the watersheds during the Construction and Development Phase and the Production Phase under Alternative A, respectively.
**Table 4.6.1.1.1.4-4** summarizes the sediment yield produced for existing conditions and during each project phase.

**Table 4.6.1.1.1.4-1. Sediment Yield Under Existing Conditions**

| Sediment Source | Antelope Creek Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 14.9 | 1.9 | 8.2 | 24.9 |
| Well Pads and Facilities | 0 | 0 | 0 | 0 | 0 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,494 | 22,829 | 122,245 | 204,759 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.1.1.4-2. Sediment Yield During Well Drilling and Completion Phase Under Alternative A – Proposed Action**

| Sediment Source | Antelope Creek Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 36.3 | 6.1 | 19.8 | 62.2 |
| Well Pads and Facilities | 0 | .004 | .002 | .008 | .013 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,515 | 22,833 | 122,257 | 204,796 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.1.1.4-3. Sediment Yield During Production Phase Under Alternative A – Proposed Action**

| Sediment Source | Antelope Creek Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 18.9 | 3.3 | 9.9 | 32.1 |
| Well Pads and Facilities | 0 | 0 | 0 | 0 | 0 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,498 | 22,830 | 122,247 | 204,766 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.1.1.4-4. Total Sediment Yield Comparison Under Alternative A – Proposed Action**

| Sediment Source | Existing Conditions (tons/year) | Well Drilling and Completion Phase (tons/year) | Production Phase (tons/year) |
|---|---|---|---|
| Stream Crossings | 24.9 | 62.2 | 32.1 |
| Well Pads and Facilities | 0 | .013 | 0 |
| General Erosion | 204,732 | 204,732 | 204,734 |
| Total | 204,757 | 204,794 | 204,766 |
| Increase Over Existing Conditions | - | 37 | 7 |
| Percent Increase Over Existing Conditions | - | <0.1% | <0.1% |

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. Assuming that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the Well Drilling and Completion Phase and the Production Phase. The actual amount of sediment that would reach the drainages within the MBPA, including Pariette Draw and the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percent.

It is important to note that these calculations are approximate. The actual amount of additional sediment loading to MBPA drainages and the Green River is dependent on the natural factors listed above, precipitation amounts and timing, channel conditions, BMP efficiency, and reclamation success or failure. In addition, the erosion calculations are also approximate and should be regarded as accurate only to within +/-100 percent. Nonetheless, these estimates provide a useful way to compare the potential

impacts of the various alternatives against each other, in addition to providing estimates of the increased sediment delivery to MBPA drainages and the Green River.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the project would slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment will settle out in the first pond and not be conveyed to subsequent ponds. The increased load to the first pond should have a negligible effect on the pond over the LOP.

In addition to the direct erosion of soil surfaces described above, increased traffic levels associated with the Proposed Action would increase the amount of dust generated in the MBPA. Deposition of fugitive dust on vegetation and rock surfaces and directly in stream channels has the potential to slightly increase turbidity levels within the perennial creeks in the MBPA. The amount of potential turbidity increase through this mechanism cannot be quantified, but is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils.

Because the Proposed Action has a negligible effect on flow in the Green River, the alternative should not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect should be minor and would actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if erosion is increase and flow is decrease, there would be some deposition in the channel bottoms.

New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there was increased runoff, it would lead to slightly higher peak flows that could potentially increase erosion of roadside ditches and channel banks. The increased erosion could also potentially raise turbidity and salinity in streams during storm events.

One freshwater collection well would be constructed within the floodplain of the Green River. Construction of the collection well would disturb about 0.2 acres on the floodplain. A temporary increase in erosion and sedimentation in the Green River could occur during construction of this well. However, given the small amount of disturbance and the proposed construction timing occurring during the winter months, the increased sedimentation to the Green River would be negligible.

Because of the small percentage of additional sediment added under the Proposed Action, it should have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The alternative should have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses including irrigation of crops and stock watering. It is not expected that the small increase in sediment load will significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load will affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load will negatively impact the water quality for agricultural uses.

#### *4.6.1.1.1.5 Groundwater Resources*

Groundwater Depletion

Groundwater exists in shallow unconsolidated alluvium along Pariette Draw, Gilsonite Draw, and Wells Draw along the lower portions of the larger ephemeral washes, and in deeper bedrock formations beneath the MBPA. However, because of limited development and the great depth to the bedrock aquifers, only a few water wells are located within the MBPA.

Only existing permitted groundwater sources would be used for drilling, completion, or production activities related to this project. While some of this groundwater would be injected back into the groundwater, these activities would result in permanent withdrawals of groundwater (produced formation water). Under the Proposed Action, groundwater withdrawal would result in total aquifer drawdown of approximately 44,226 acre-feet over a 41- to 51-year LOP or about 867 acre-feet per year (see **Table 4.6.1.1.1.5-1**). Assuming no recharge, this represents a 0.14 percent decrease in the estimated 31 million acre-feet of water stored in aquifers in the Uinta Basin (UDWaR 1999), which would have a negligible impact on the quantity of groundwater in the area (see **Table 4.6.1.1.1.5-1**). Locally, these withdrawals may lower the water table, which could reduce the water supply available for domestic users and reduce flow into streams and springs.

**Table 4.6.1.1.1.5-1. Groundwater Use in Uinta Basin Aquifers**

| Groundwater Use | Alternative A (Proposed Action) | Alternative B (No Action) | Alternative C (Field-wide Electrification) | Alternative D (Resource Protection) |
|---|---|---|---|---|
| Net Groundwater Withdrawal (acre-feet) over the LOP | 44,226 | 8,910 | 44,226 | 86,744 |
| Percent decrease in water stored in Uinta Basin aquifers | 0.14% | 0.029% | 0.14% | 0.27% |

Groundwater Quality

*Deep or Confined Aquifers*

Potential direct and indirect impacts to usable groundwater sources under the Proposed Action would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below.

The MBPA does not overlie a Sole Source Aquifer (SSA) or a Utah Drinking Water Source Protection Zone (DWSPZ). On federal leases, usable groundwater resources are protected during drilling in accordance with BLM Onshore Oil and Gas Order No. 2, which requires that all formations containing usable quality water (≤10,000 mg/L total dissolved solids) be isolated and protected using cement in the wells.

Per BLM standard practice, a site-specific analysis of groundwater and groundwater protection would be conducted during BLM's review of an APD using the Utah groundwater protection IM No. UT 2010-055.

A BLM geologist and/or hydrologist would perform an independent review of each APD using UGS and USGS geologic and hydrologic data and maps to generate a geologic report. The geologist and/or hydrologist would identify usable groundwater and mineral-bearing zones that require protection. A petroleum engineer would review the casing and cementing portions of the drilling plan to ensure the protection of those zones identified by the geologic report. A natural resource specialist (NRS) would review the surface use plan and determine the adequacy of reserve pit design. COAs would be attached to the APD as necessary.

Operators are encouraged to substitute less toxic substances (chromate, lead, etc.), yet equally effective chemicals, for conventional drilling products such as mud and pipe dope. To prevent contamination of groundwater and soils (or to conserve water), the BLM suggests that operators use a closed-loop drilling system or line reserve pits with an impermeable liner if pits are constructed in areas of shallow groundwater or in porous soils over fractured bedrock. If the AO determines it is necessary, as verified during the onsite or permit review, the BLM would make this a requirement by attaching a COA at the time of APD approval. The BLM has the authority to require companies to do reasonable testing of groundwater quality and quantity during drilling, if deemed necessary, in accordance with 43 CFR 3162.4-2.

Groundwater zones would be protected by cementing the surface casing to the ground surface and also bringing the cement for the production or intermediate casing to at least 200 feet above the surface casing shoe. The annular space between the borehole and the casings for the entire length of the surface casings would be sealed with cement to isolate any underground sources of drinking water. A cement bond log will be run to ensure that the seal is adequate. As necessary, a COA would be attached to the APD. The COA would specify the anticipated formation and depth where usable quality water might be encountered. Petroleum engineering technicians would inspect well sites during drilling, completion, and production for technical and safety compliance.

BLM Onshore Oil and Gas Order No. 7, Disposal of Produced Water (43 CFR 3162.5 – Environment and Safety) specifies the information and procedures required to submit an application for the disposal of produced water, as well as the design, construction, and maintenance requirements for disposal pits. All produced water from federal leases must be disposed of as follows: 1) by injection into the subsurface, which is regulated by the EPA or UDOGM within the UIC programs; 2) into pits, which is regulated by BLM or UDOGM; or 3) by other acceptable methods approved by the AO, including surface discharge under the National Pollutant Discharge Elimination System (NPDES) as regulated by UDEQ. Injection of produced water on federal lands in Utah is regulated by Utah Administrative Rule R649-5: Underground Injection Control of Recovery Operations and Class II Injection Wells. Injection of produced water on Indian lands in Utah is administered by the EPA under 40 CFR 17.2253.

If wells are properly completed, as previously discussed, there should be sufficient distance between the zones that are hydraulically fractured and the aquifers with usable water that the aquifers should not be affected by hydraulic fracturing.

*Shallow or Alluvial Aquifers*

Spills or leaks of fuels, lubricants, natural gas condensate, produced water, or other chemicals from well pads and pipelines have the potential to contaminate groundwater resources, especially the shallow alluvial groundwater. Containment structures would be constructed around all tank batteries and would be consistent with EPA's SPCC regulations. All spills or leakages must be reported immediately by the operator to the BLM in accordance with Notice to Lessees NTL-3A.

A spill of natural gas condensate from a tanker truck directly into surface water drainage would have the greatest potential to contaminate groundwater. As discussed above for surface water, approximately two to 10 spills from a tanker truck could be expected to occur over the LOP on MBPA roads. Therefore, the probability of a spill occurring directly into a drainage is less than one event over the LOP. If a spill is detected, the SPCC Plan would be implemented to minimize, control, and cleanup the affected area. The measures provided in the SPCC Plan would minimize the chance that spilled material enters a surface water feature and subsequently impacts shallow groundwater by providing a rapid response to any spill events.

Any shallow groundwater zones encountered during drilling of the proposed wells would be properly protected and the presence of these water-bearing zones reported to the appropriate agencies. All hydrocarbon-producing zones would be cemented off and tested. After the completion of drilling operations, the producing formation would be logged and production casing run and cemented in accordance with the drilling program approved in the APD. The casing and cementing program would be designed to isolate and protect the shallower formations encountered in the wellbore and to prohibit pressure communication or fluid migration between different formations. In addition, the cement would protect the well by preventing formation pressure from damaging the casing and retarding corrosion by minimizing contact between the casing and formation. These measures would isolate all water-bearing formations in the borehole and would effectively eliminate communication between hydrocarbon-bearing zones and the shallow groundwater aquifers.

Because reserve pit liners sometimes fail, an inspection program would be implemented and repairs to the liner would be done quickly to prevent downward migration of contaminated water. If the liners remain intact, all contaminants would be contained within the reserve pits and immobilized by drying and burial. If liners were breeched prior to pit closure and if groundwater were present in the area, soluble salts (sodium chloride [NaCl] and potassium chloride [KCl]), hydrocarbons, and metals could potentially migrate to groundwater. However, based on the success of similar liner use in reserve pits in the Uinta Basin, such leakage is considered to be unlikely, and if a leak were to occur, the potential that these contaminants would impact groundwater quality would be low. If these contaminants were to reach groundwater, impacts would likely be localized. In addition, the limited occurrence of shallow groundwater, the presence of fine-grained soils and sandstones, and the limited permeability of the aquifers in the MBPA would minimize migration of contaminants from a leaking reserve pit.

*Springs*

Potential impacts to springs from the Proposed Action include decreased flows and contamination by petroleum constituents. Springs located near wells or production facilities could potentially be contaminated by benzene of other petroleum constituents. Benzene and other constituents could potentially migrate along fracture systems to springs if proper completion and cementing procedures are not followed.

### 4.6.1.2 Alternative B – No Action

#### 4.6.1.2.1 Water Requirements

##### *4.6.1.2.1.1 Well Drilling and Completion Phase*

About 0.9 acre-feet of water would be required to drill and complete each Green River oil well in the MBPA. The total water use for drilling and completion of all 788 wells under the No Action Alternative

would be about 709 acre-feet, or approximately 322 acre-feet of water per year over the 2.2-year drilling and completion activities period.

Additionally, it is assumed that a total of 0.08 acre-feet would be needed for dust suppression at each well pad, access road, and pipeline/utility corridor during construction activities for the new 788 well pads. It is assumed that only 10 percent of this total amount will be needed on an annual basis. Assuming that construction will occur over a 2.2-year period, Newfield would need a total of about 6 acre-feet total or 3 acre-feet annually for dust suppression during well construction and completion.

During the Well Drilling and Completion Phase, about 325 acre-feet per year is needed for well drilling and completion (322 acre-feet/year) and dust suppression 3 acre-feet/year). It is assumed that necessary water will be acquired from permitted surface water before permitted groundwater sources. Thus, so the entire annual requirement (325 acre-feet) will be obtained from permitted surface water sources.

#### *4.6.1.2.1.2 Production Phase*

In addition, it is assumed that about 0.13 acre-feet per well pad would be used annually for dust suppression at each well pad, access road, and pipeline/utility corridor during the operation of the wells, which will occur after well construction for 20 to 30 years. Based on these assumptions, Newfield would use approximately 10 acre-feet of water annually for dust suppression and 203- to 304-acre-feet for the 20- to 30-year period of operation.

Water-flooding would be used at all of the proposed 40-acre spacing Green River wells (approximately 128 wells). Assuming approximately 0.01 acre-feet of water would be used daily for each water-flood injection well, the annual water requirement for water-flooding operations would be about 548 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water.

During the Production Phase, 558 acre-feet per year is need for water-flooding (548 acre-feet/year) and dust suppression (10 acre-feet/year). It is assumed that recycled produced water will constitute 50 percent of water needed for production. If each of the 788 wells produces (assuming 0.24 acre-feet of water per well per year can be recycled), then approximately 189 acre-feet of produced water would be used to offset water depletions associated with the No Action Alternative. Therefore, under the No Action Alternative, the remaining 369 acre-feet per year will be obtained from permitted surface water sources (382 acre-feet available) and permitted groundwater sources.

#### 4.6.1.2.1.3 Abandonment and Reclamation Phase

During the Abandonment and Reclamation Phase, 10 acre-feet per year would be needed for dust suppression. Because the wells would no longer be producing under this phase, this entire need would be met from permitted surface water sources. **Table 4.6.1.2.1.3-1** shows the water requirements and source of water for Alternative B.

**Table 4.6.1.2.1.3-1. Water Requirements and Water Availability for Alternative B – No Action**

| Project Phase | Total Water Requirement (acre-feet/year)* | Available Permitted Surface Water (acre-feet/year) | Available Permitted Groundwater (acre-feet/year) | Available Recycled Produced Water (acre-feet/year) | Recycled Produced Water Use (acre-feet/year) | Permitted Surface Water Use (acre-feet/year) | Permitted Groundwater Use (acre-feet/year) |
|---|---|---|---|---|---|---|---|
| Well Drilling and Completion (2.2 years) | 325 | 382 | 12,236 | 0 | 0 | 325 | 0 |
| Production (20-30 years) | 558 | 382 | 12,236 | 189 | 189 | 369 | 0 |
| Abandonment and Reclamation (5 years) | 10 | 382 | 12,236 | 0 | 0 | 10 | 0 |

*Summations between water use tables may be inconsistent due to rounding.

### *4.6.1.2.1.4 Surface Water Resources*

Surface Water Use

During the Well Drilling and Completion Phase, surface water needs of 325 acre-feet per year for Alternative B could potentially deplete the flow in the Green River (3,933,750 acre-feet per year) by less than 0.01 percent. During the Production Phase, it is assumed that the water needs will be offset by recycled produced water; however, all 369 acre-feet per year of permitted surface water would be needed for the production phase. During the Abandonment and Reclamation Phase, Alternative B would have a negligible effect on the Green River flow. Assuming a constant water demand throughout the year, the water demand in January (10 acre-feet) would be less than 0.01 percent of the flow in the Green River (118,000 acre-feet). Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

On an annual basis, Alternative B would use a maximum of 325 acre-feet per year and could potentially deplete the flow in Pariette Draw (16,500 acre-feet per year) about 2 percent. The maximum water demand in January would be about 19 acre-feet of water, which would be about 4 percent of the flow in the Pariette Draw. In October, the water demand would be about 1 percent of the Pariette Draw flow. This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet project demands and reduce any negative environmental impacts.

Floodplains

Under Alternative B, pipelines would cross ephemeral streams at approximately 783 locations within the MBPA Because the pipelines would be buried in the floodplains, the project would have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that after construction the well will be flush with the ground surface, the drilling pad will be reclaimed, and there will be no storage of hydrocarbons in the floodplains.

Surface Water Quality

Accidental spillage of potentially toxic substances due to pipeline, wellhead, and storage tank leaks and tanker truck spills at stream crossings could potentially occur under Alternative B. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

If it is assumed that the number and quantity of spills is proportional to the number of wells drilled and operated, then Alternative B would potentially have about 14 percent (788/5750) of the spillage that would occur under the Proposed Action. If the probability of a release of a hazardous substance during an accident is 1.0 to 6.5 percent, then between 0.3 and 1.4 significant releases of condensate or produced water from a tanker truck could be expected to occur in the MBPA during the LOP.

Specific actions under Alternative B could reduce or minimize impacts to surface waters related to accidental spills or loss of containment. Specifically, actions identified in the required SPCC Plans for each well site would be implemented to minimize the chance that petroleum products and other chemicals would leave the site and contaminate surface waters.

Hydrofracturing would occur at depths that are at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from the proposed hydrofracturing is considered to be negligible.

*Total Maximum Daily Load Constituents of Concern*

Because selenium, boron, and salts (TDS) are found in the soil and attach themselves to soil particles, additional eroded material as a result of the proposed project that is conveyed to Pariette Draw will contain these constituents of concern and will increase their concentration slightly in Pariette Draw; however, increases would be less under Alternative B than under the Proposed Action.

*Sediment, Turbidity, and Temperature*

Increased erosion and subsequent increased sedimentation of perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. However, it would be less than what would be produced under Alternative A.

**Tables 4.6.1.2.1.4-1** and **4.6.1.2.1.4-2** provide sediment yield estimates in the watersheds during the Construction and Development Phase and the Production Phase under Alternative B, respectively. **Table 4.6.1.2.1.4-3** summarizes the sediment yield produced for existing conditions and during each project phase.

**Table 4.6.1.2.1.4-1. Sediment Yield During Well Drilling and Completion Phase Under Alternative B – No Action**

| Sediment Source | Antelope Creek Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 30.7 | 3.6 | 15.0 | 49.2 |
| Well Pads and Facilities | 0 | .0007 | 0 | .0005 | .001 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,510 | 22,831 | 122,252 | 204,783 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.2.1.4-2. Sediment Yield During Production Phase Under Alternative B – No Action**

| Sediment Source | Antelope Creek Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 15.6 | 2.0 | 7.1 | 24.7 |
| Well Pads and Facilities | 0 | 0 | 0 | 0 | 0 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,495 | 22,829 | 122,244 | 204,759 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.2.1.4-3. Total Sediment Yield Comparison Under Alternative B – No Action**

| Sediment Source | Existing Conditions (tons/year) | Well Drilling and Completion Phase (tons/year) | Production Phase (tons/year) |
|---|---|---|---|
| Stream Crossings | 24.9 | 49.2 | 24.7 |
| Well Pads and Facilities | 0 | .001 | 0 |
| General Erosion | 204,732 | 204,732 | 204,734 |
| Total | 204,757 | 204,781 | 204,759 |
| Increase Over Existing Conditions | - | 24 | 0 |
| Percent Increase Over Existing Conditions | - | <0.1% | 0% |

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. Assuming that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the Well Drilling and Completion Phase and Production Phase. The actual amount of sedimentation that would reach the drainages with the MBPA including Pariette Draw and the Green River would depend on the effectiveness of reclamation and BMPs employed to control erosion. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percent.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the project could slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment will settle out in the first pond and not be conveyed to subsequent ponds. The increased load to the first pond should have a negligible effect on the pond over the LOP.

The amount of potential turbidity increase through fugitive dust cannot be quantified, but is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils. New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there was increased runoff, it would lead to slightly higher peak flows, potentially increasing erosion of roadside ditches and channel banks. The increased erosion could potentially raise turbidity and salinity in streams during storm events.

Because Alternative B has a negligible effect on flow in the Green River, the alternative should not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect should be minor and would actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if erosion is increased and flow is decreased, there would be some deposition in the channel bottoms.

Because of the small percentage of additional sediment added under Alternative B, it should have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The alternative should have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses including irrigation of crops and stock watering. It is not expected that the small increase in sediment load will significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load will affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load will negatively impact the water quality for agricultural uses.

#### *4.6.1.2.1.5 Groundwater Resources*

Groundwater Depletion

Assuming that permitted surface water sources will be used before groundwater sources, no new groundwater would be used under this alternative. If it is assumed that the amount of groundwater produced is proportional the number of wells in the alternative, Alternative B will pump about 8,910 acre-feet of water, assuming a 28- to 38-year LOP or about 234 acre-feet per year (see **Table 4.6.1.1.1.5-1**). Assuming no recharge, this represents a 0.029 percent decrease in the estimated 31 million acre-feet of

water stored in aquifers in the Uinta Basin (UDWaR 1999), which would have a negligible impact on the quantity of groundwater in the area (see **Table 4.6.1.1.1.5-1**).

Groundwater Quality

*Deep or Confined Aquifers*

Under Alternative B, potential direct and indirect impacts to usable groundwater sources would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below. These stipulations would be the same as what would be used for the Proposed Action.

*Shallow or Alluvial Aquifers*

Under the No Action Alternative, potential direct and indirect impacts to shallow or alluvial groundwater sources would be effectively eliminated, reduced, or mitigated through the same measures as what would be used for the Proposed Action

The potential for contaminating shallow or alluvial aquifers under Alternative B is thought to be less than what would be expected for Alternative A because there are fewer wells under Alternative B.

*Springs*

Under Alternative B, the potential impacts to springs are the same as what would be expected for the Proposed Action; however, because there are fewer wells under Alternative B, the risk of contamination to springs is less.

### 4.6.1.3 Alternative C – Field-Wide Electrification

#### 4.6.1.3.1 Water Requirements

##### *4.6.1.3.1.1 Well Drilling and Completion Phase*

Water requirements under this phase would be the same as under the Proposed Action. Approximately 0.9 acre-feet of water would be required to drill and complete each Green River oil well and about 6.2 acre-feet would be required to drill and complete each deep gas well. The total water use for drilling and completion of all Green River oil wells (3,250 wells) and deep gas wells (2,500 wells) under Alternative C would be approximately 18,425 acre-feet, or approximately 1,150 acre-feet of water annually over the 16-year drilling and completion activities period.

In addition, a total of 0.08 acre-feet of water would be needed for dust suppression at each well pad, access road, and pipeline/utility corridors during construction activities for the new well pads (5,750 wells). It is further assumed that only 10 percent of this total amount will be needed on an annual basis. Newfield would need a total of about 46 acre-feet for dust suppression during well construction and completion or about 3 acre-feet per year over the 16-year drilling and completion activities period.

During the Well Drilling and Completion Phase, the annual water demand would be approximately 1,153 acre-feet for the 16-year drilling and completion activities period. It is assumed that necessary water will be acquired from permitted surface water before permitted groundwater sources. The available permitted

surface water sources total about 382 acre-feet per year, so the remainder (771 acre-feet/year) will be obtained from permitted groundwater sources.

#### *4.6.1.3.1.2 Production Phase*

Water requirements under this phase would be the same as under the Proposed Action. It is assumed that approximately 0.13 acre-feet of water would be used annually for dust suppression at each well pad, access road, and pipeline/utility corridor during the operation of the wells, which will occur after well construction for 20 to 30 years. This water use applies to only 10 percent of the wells. Based on these assumptions, Newfield would use approximately 75 acre-feet of water annually for dust suppression and 1,500- to 2,250-acre-feet for the 20- to 30-year period of operation.

Water-flooding would be used at all of the proposed 40-acre spacing Green River wells (approximately 750 wells). Assuming approximately 0.01 acre-feet of water would be used daily for each water-flood injection well, the annual water requirement for water-flooding operations would be about 2,738 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water and the other 50 percent would come from freshwater sources.

The annual water requirement is the sum of the dust suppression (75 acre-feet/year) and water-flooding water demands (2,738 acre-feet/year), or 2,813 acre-feet. It is assumed that recycled produced water would constitute 50 percent of water needed for production. If each of the 5,750 wells produces (assuming 0.24 acre-feet of water can be recycled), then there would be 1,369 acre-feet of recycled water available to be used each year. The remainder of the water demand would be met by permitted surface water sources (382 acre-feet/year) and permitted groundwater sources (about 1,063 acre-feet/year).

#### *4.6.1.3.1.3 Abandonment and Reclamation Phase*

During the Abandonment and Reclamation Phase, the well pads and appurtenant facilities would still need dust suppression, so the annual water demand would be 75 acre-feet. Because the wells are no longer producing, this entire demand will be met from permitted surface water sources. **Table 4.6.1.3.1.3-1** shows the water requirements and source of water for Alternative C.

**Table 4.6.1.3.1.3-1. Water Requirements and Water Availability for Alternative C – Field-wide Electrification**

| Project Phase | Total Water Requirement (acre-feet/year) | Available Permitted Surface Water (acre-feet/year) | Available Permitted Groundwater (acre-feet/year) | Available Recycled Produced Water (acre-feet/year) | Recycled Produced Water Use (acre-feet/year) | Permitted Surface Water Use (acre-feet/year) | Permitted Groundwater Use (acre-feet/year) |
|---|---|---|---|---|---|---|---|
| Well Drilling and Completion (16 years) | 1,153 | 382 | 12,236 | 0 | 0 | 382 | 771 |
| Production (20-30 years) | 2,813 | 382 | 12,236 | 1,369 | 1,369 | 382 | 1,063 |
| Abandonment and Reclamation (5 years) | 75 | 382 | 12,236 | 0 | 0 | 75 | 0 |

### *4.6.1.3.1.4 Surface Water Resources*

Surface Water Use

During the Well Drilling and Completion Phase, surface water needs of 382 acre-feet per year for Alternative C could potentially deplete the flow in the Green River (3,933,750 acre-feet per year) by less than 0.01 percent. During the Production Phase, its surface water needs would be identical to those during the well drilling and completion because both require the maximum permitted amount. During the Abandonment and Reclamation Phase, Alternative C would require 75 acre-feet per year and would have a negligible effect on the Green River flow. Assuming a constant water demand throughout the year, the monthly water demand (32 acre-feet) would be about 0.03 percent of the flow in the Green River in January (118,000 acre-feet). Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

On an annual basis, Alternative C would use a maximum of 382 acre-feet per year and could potentially deplete the flow in Pariette Draw (16,500 acre-feet per year) about 2.3 percent. Assuming a constant water demand, the monthly water demand would be about 32 acre-feet of water, which would be about 6.8 percent of the January flow in Pariette Draw (470 acre-feet). In October, the water demand would be about 1.6 percent of the Pariette Draw flow (2,900 acre-feet). This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet project demands.

Floodplains

Under Alternative C, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA Because the pipelines will be buried in the floodplains, the project will have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that after construction the well will be flush with the ground surface, the drilling pad will be reclaimed, and there will be no storage of hydrocarbons in the floodplains.

Surface Water Quality

Accidental spillage of potentially toxic substances due to pipeline, wellhead, and storage tank leaks and tanker truck spills at stream crossings could potentially occur under Alternative C. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

If the number and quantity of spills is proportional to the number of wells drilled and operated, then Alternative C would potentially have the same spillage that what would occur under the Proposed Action.

Specific actions under Alternative C could reduce or minimize impacts to surface waters related to accidental spills or loss of containment. Specifically, actions identified in the required SPCC Plans for each well site would be implemented to minimize the chance that petroleum products and other chemicals would leave the site and contaminate surface waters.

Hydrofracturing would occur at depths of at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from the proposed hydrofracturing is considered to be negligible.

*Total Maximum Daily Load Constituents of Concern*

Alternative C could have some effect on the TMDL constituents of concern (selenium, boron, and TDS). Because these constituents are found in the soil and attach themselves to soil particles, additional eroded material as a result of the proposed project that is conveyed to Pariette Draw will contain these constituents of concern and will increase their concentration slightly in Pariette Draw.

*Sediment, Turbidity, and Temperature*

Increased erosion and subsequent increased sedimentation of perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and the Green River would depend on the effectiveness of reclamation and BMPs employed to control erosion.

**Tables 4.6.1.3.1.4-1** and **4.6.1.3.1.4-2** provide sediment yield estimates in the watersheds during the Construction and Development Phase and the Production Phase under Alternative C, respectively. **Table 4.6.1.3.1.4-3** summarizes the sediment yield produced for existing conditions and during each project phase.

**Table 4.6.1.3.1.4-1. Sediment Yield During Well Drilling and Completion Phase Under Alternative C – Field-wide Electrification**

| Sediment Source | Antelope Creek Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 36.3 | 6.1 | 19.8 | 62.2 |
| Well Pads and Facilities | 0 | .004 | .002 | .008 | .013 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,515 | 22,833 | 122,257 | 204,796 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.3.1.4-2. Sediment Yield During Production Phase Under Alternative C – Field-wide Electrification**

| Sediment Source | Antelope Creek Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 18.9 | 3.3 | 9.9 | 32.1 |
| Well Pads and Facilities | 0 | 0 | 0 | 0 | 0 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,498 | 22,830 | 122,247 | 204,766 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.3.1.4-3. Total Sediment Yield Comparison Under Alternative C – Field-wide Electrification**

| Sediment Source | Existing Conditions (tons/year) | Well Drilling and Completion Phase (tons/year) | Production Phase (tons/year) |
|---|---|---|---|
| Stream Crossings | 24.9 | 62.2 | 32.1 |
| Well Pads and Facilities | 0 | .013 | 0 |
| General Erosion | 204,732 | 204,732 | 204,734 |
| Total | 204,757 | 204,794 | 204,766 |
| Increase Over Existing Conditions | - | 37 | 7 |
| Percent Increase Over Existing Conditions | - | <0.1% | <0.1% |

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. If it is assumed that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the Well Drilling and Completion Phase and Production Phase. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percent.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the project could slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment will settle out in the first pond and not be conveyed to subsequent ponds. The increased load to the first pond should have a negligible effect on the pond over the LOP.

The amount of potential turbidity increase through fugitive dust cannot be quantified, but is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils. New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there is increased runoff, it would lead to slightly higher peak flows, potentially increasing erosion of roadside ditches and channel banks. The increased erosion could potentially raise turbidity and salinity in streams during storm events.

Because Alternative C has a negligible effect on flow in the Green River, the alternative should not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect should be minor and could actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if the sediment load is increased and flow is decreased, there would be some deposition in the channel bottoms.

Because of the small percentage of additional sediment added under Alternative C, it should have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The alternative should have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses including irrigation of crops and stock watering. It is not expected that the small increase in sediment load will significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load will affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load will negatively impact the water quality for agricultural uses.

#### *4.6.1.3.1.5 Groundwater Resources*

Groundwater Depletion

Groundwater exists in shallow unconsolidated alluvium along Pariette Draw, Gilsonite Draw, and Wells Draw along the lower portions of the larger ephemeral washes and in deeper bedrock formations beneath the MBPA. However, because of limited development and the great depth to the bedrock aquifers, only a few water wells are located within the MBPA.

Only existing permitted groundwater sources would need to be used for drilling, completion, or production activities related to this project. While some of this groundwater would be injected back into the groundwater, these activities would result in permanent withdrawals of groundwater (produced formation water). Under Alternative C, produced groundwater would result in total aquifer drawdown of approximately 44,226 acre-feet over a 41- to 51-year LOP or about 867 acre-feet per year (see **Table 4.6.1.1.1.5-1**). Assuming no recharge, this represents a 0.14 percent decrease in the estimated 31 million acre-feet of water stored in aquifers in the Uinta Basin (UDWaR 1999), which would have a negligible impact on the quantity of groundwater in the area (see **Table 4.6.1.1.1.5-1**). Locally, these withdrawals may lower the water table, which could reduce the water supply available for domestic users and reduce flow into streams and springs.

Groundwater Quality

*Deep or Confined Aquifers*

Under Alternative C, potential direct and indirect impacts to usable groundwater sources would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below; the same as for the Proposed Action. These stipulations would be the same as what would be used for the Proposed Action.

*Shallow or Alluvial Aquifers*

Under Alternative C, potential direct and indirect impacts to shallow or alluvial groundwater sources would be effectively eliminated, reduced, or mitigated through the same measures as what would be used for the Proposed Action.

Although Alternative C and the Proposed Action have the same number of wells, the potential for contaminating shallow or alluvial aquifers under Alternative C would be slightly greater than those for the Proposed Action because more surface disturbance is anticipated under Alternative C.

*Springs*

Even though Alternative C and the Proposed Action have the same number of wells, the potential impacts and risk of contamination to springs would be slightly greater under Alternative C than what would be expected for the Proposed Action because more surface disturbance is anticipated under Alternative C.

#### 4.6.1.4 Alternative D – Resource Protection

##### 4.6.1.4.1 Water Requirements

Under Alternative D, no surface disturbance would occur within 100-year floodplains.

###### *4.6.1.4.1.1 Well Drilling and Completion Phase*

About 0.9 acre-feet of water would be required to drill and complete each Green River oil well and about 6.2 acre-feet would be required to drill and complete each deep gas well. The total water use for drilling and completion of all Green River oil wells (3,519 wells) and deep gas wells (1,539 wells) would be about 12,710 acre-feet, or approximately 908 acre-feet of water per year over the 14-year drilling and completion activities period. Under Alternative D, 40 to 50 percent of water for flooding operations would come from recycled sources.

It is assumed that a total of 0.08 acre-feet would be needed for dust suppression at each well pad, access road, and pipeline/utility corridor during construction activities for the new well pads (5,058 wells). It is further assumed that only 10 percent of this total amount will be needed on an annual basis. Newfield would need a total of about 40 acre-feet for dust suppression during well construction and completion or about 3-acre-feet per year over the 14-year drilling and completion activities period.

During the Well Drilling and Completion Phase, the annual water demand would be 908 acre-feet for the 14-year drilling and completion activities period. It is assumed that necessary water will be acquired from permitted surface water sources before permitted groundwater sources. The available permitted surface water sources total about 382 acre-feet per year, assuming the Drilling and Completion period is 14-years, then the remainder (526 acre-feet/year) would be obtained from permitted groundwater sources.

##### 4.6.1.4.1.2 Production Phase

It is assumed that about 0.13 acre-feet per well pad would be used annually for dust suppression at each well pad (5,058 wells), access road, and pipeline/utility corridor during the operation of the wells, which will occur after well construction for 20 to 30 years. This water use applies to only 10 percent of the wells annually. Based on these assumptions, Newfield would use approximately 66 acre-feet of water per year for dust suppression and 1,320- to 1,980 acre-feet for the 20- to 30- year period of operation.

Approximately 1,144 existing wells within the MBPA would be converted to water-flood injection wells. Assuming approximately 0.01 acre-feet of water would be used daily for each water-flood injection well, the annual water requirement for water-flooding operations would be about 4,176 acre-feet. It is expected that about 50 percent of the water needed for flooding operations would come from recycled produced water and the other 50 percent would come from fresh water sources.

The annual water requirement is sum of the dust suppression and water-flooding water demands or 4,242 acre-feet. It is assumed that recycled produced water will constitute 50 percent of water needed for

production. If each of the 5,058 wells produces (assuming 0.24 acre-feet of water that can be recycled), then there would be 1,214 acre-feet of recycled water available to be used each year. Additionally, Alternative D would use all of the available annual surface water allotments (382 acre-feet per year). The remainder of the water demand (2,646 acre-feet/year) would be met by permitted groundwater sources.

#### *4.6.1.4.1.3 Abandonment and Reclamation Phase*

During the Abandonment and Reclamation Phase, the well pads and appurtenant facilities would still need dust suppression, so the annual water demand would be 66 acre-feet. Because the wells are no longer producing, this entire demand will be met from permitted surface water sources. **Table 4.6.1.4.1.3-1** shows the water requirements and source of water for Alternative D.

**Table 4.6.1.4.1.3-1. Water Requirements and Water Availability for Alternative D – Resource Protection**

| Project Phase | Total Water Requirement (acre-feet/year) | Available Permitted Surface Water (acre-feet/year) | Available Permitted Groundwater (acre-feet/year) | Available Recycled Produced Water (acre-feet/year) | Recycled Produced Water Use (acre-feet/year) | Permitted Surface Water Use (acre-feet/year) | Permitted Groundwater Use (acre-feet/year) |
|---|---|---|---|---|---|---|---|
| Well Drilling and Completion (14 years) | 908 | 382 | 12,236 | 0 | 0 | 382 | 526 |
| Production (20-30 years) | 4,242 | 382 | 12,236 | 1,323 | 1,214 | 382 | 2,646 |
| Abandonment and Reclamation (5 years) | 66 | 382 | 12,236 | 0 | 0 | 66 | 0 |

#### *4.6.1.4.1.4 Surface Water Resources*

Surface Water Use

During the Well Drilling and Completion Phase, surface water needs of 382 acre-feet per year for Alternative D would potentially deplete the flow in the Green River (3,933,750 acre-feet per year) by less than 0.01 percent. During the Production Phase, its surface water needs would be identical to those during the well drilling and completion as both require the maximum permitted amount. During the Abandonment and Reclamation Phase, Alternative D would require only 66 acre-feet per year and would have a negligible effect on the Green River flow. Assuming a constant water demand throughout the year, the monthly water demand (32 acre-feet) would be about 0.03 percent of the flow in the Green River in January (118,000 acre-feet). Thus, the project-related flow depletion would be negligible from a hydrologic standpoint.

On an annual basis, Alternative D would use a maximum of 382 acre-feet per year and would potentially deplete the flow in Pariette Draw (16,500 acre-feet per year) about 2.3 percent. Assuming a constant water demand, the monthly water demand would be about 32 acre-feet of water, which would be about 6.8 percent of the January flow in Pariette Draw(470 acre-feet). In October, the water demand would be

about 1.6 percent of the Pariette Draw flow (2,900 acre-feet). This is a minor percent of the total flow, but it may need to be mitigated by using groundwater to meet project demands.

Floodplains

Under Alternative D, pipelines would cross ephemeral streams at approximately 868 locations within the MBPA. Because the pipelines will be buried in the floodplains, the project will have no impact on the width of the floodplain or the water surface elevation for a given flood event. The water source well would have minimal impacts on the floodplain, even in the event of a 100-year flood, given that after construction the well will be flush with the ground surface, the drilling pad will be reclaimed, and there will be no storage of hydrocarbons in the floodplains.

Surface Water Quality

Accidental spillage of potentially toxic substances due to pipeline, wellhead, and storage tank leaks and tanker truck spills at stream crossings could potentially occur under Alternative D. The magnitude of these impacts would be largely dependent on the proximity of the spill to surface water features, the volume of material spilled, the permeability of the soils in the area, the ground slope between the spill site and the surface water feature, and the timing and intensity of rainfall or snowmelt.

It is assumed that the number and quantity of spills is proportional to the number of wells drilled and operated, Alternative D would potentially have about 88 percent (5,058/5,750) of the spillage that would occur under the Proposed Action. If the probability of a release of a hazardous substance during an accident is 1.0 to 6.5 percent, then between 1.8 and 8.8 significant releases of condensate or produced water from a tanker truck could be expected to occur in the MBPA during the LOP.

Specific actions under Alternative D could reduce or minimize impacts to surface waters related to accidental spills or loss of containment. Specifically, actions identified in the required SPCC Plans for each well site would be implemented to minimize the chance that petroleum products and other chemicals would leave the site and contaminate surface waters.

Hydrofracturing would occur at depths of at least 4,500 feet or more below the surface; therefore, the potential for impacts to surface water resources from the proposed hydrofracturing is considered to be negligible.

*Total Maximum Daily Load Constituents of Concern*

Alternative D could have some effect on the TMDL constituents of concern (selenium, boron, and TDS). These constituents are found in the soil and attach themselves to soil particles, additional eroded material as a result of the proposed project that is conveyed to Pariette Draw will contain these constituents of concern and will increase their concentration slightly in Pariette Draw; however, increases would be less under Alternative D than under the Proposed Action.

*Sediment, Turbidity, and Temperature*

Increased erosion and subsequent increased sedimentation of perennial streams and ephemeral drainages within the MBPA is possible, especially during the construction of the project facilities. The actual amount of sedimentation that would reach the drainages within the MBPA, including Pariette Draw and

the Green River, would depend on the effectiveness of reclamation and BMPs employed to control erosion. However, it would be less than what would be produced under Alternative A.

**Tables 4.6.1.4.1.4-1 and 4.6.1.4.1.4-2** provide sediment yield estimates in the watersheds during the Construction and Development Phase and the Production Phase under Alternative D, respectively.

**Table 4.6.1.4.1.4-3** summarizes the sediment yield produced for existing conditions and during each project phase.

**Table 4.6.1.4.1.4-1. Sediment Yield During Well Drilling and Completion Phase Under Alternative D – Resource Protection**

| Sediment Source | Antelope Creek Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 34.5 | 5.1 | 16.8 | 56.4 |
| Well Pads and Facilities | 0 | .001 | 0 | .001 | .002 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,514 | 22,832 | 122,254 | 204,790 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.4.1.4-2. Sediment Yield During Production Phase Under Alternative D – Resource Protection**

| Sediment Source | Antelope Creek Watershed (tons/year) | Upper Pariette Draw Watershed (tons/year) | Sheep Wash - Green River Watershed (tons/year) | Lower Pariette Draw Watershed (tons/year) | Total Study Area (tons/year) |
|---|---|---|---|---|---|
| Stream Crossings | 0 | 17.7 | 2.8 | 8.4 | 28.8 |
| Well Pads and Facilities | 0 | 0 | 0 | 0 | 0 |
| General Erosion | 189 | 59,479 | 22,827 | 122,237 | 204,734 |
| Total | 189 | 59,497 | 22,830 | 122,245 | 204,763 |

Source Note: Summations may not total precisely due to rounding.

**Table 4.6.1.4.1.4-3. Total Sediment Yield Comparison Under Alternative D – Resource Protection**

| Sediment Source | Existing Conditions (tons/year) | Well Drilling and Completion Phase (tons/year) | Production Phase (tons/year) |
|---|---|---|---|
| Stream Crossings | 24.9 | 56.4 | 28.8 |
| Well Pads and Facilities | 0 | .002 | 0 |
| General Erosion | 204,732 | 204,732 | 204,734 |
| Total | 204,757 | 204,788 | 204,763 |
| Increase Over Existing Conditions | - | 31 | 4 |
| Percent Increase Over Existing Conditions | - | <0.1% | <0.1% |

Source Note: Summations may not total precisely due to rounding.

Based on data collected at the USGS gaging stations, annual sediment loading in the Green River at Ouray, Utah, is about 6,789,000 tons. The highest sediment loading occurs during the months of May and June from snowmelt runoff. If it is assumed that all sediment from the construction of the project facilities would eventually be transported to the Green River, the increased sediment loading to the Green River would be less than 0.1 percent during the Well Drilling and Completion Phase and Production Phase. Because of the close relationship between salinity and sediment, it is anticipated that salinity levels in the Green River would increase by a similar percent.

Water from Pariette Draw is also diverted into the Pariette Wetland ponds, so the project will slightly increase the sediment load into the first pond. Because the flow velocity through the first pond is close to zero, suspended sediment will settle out in the first pond and not be conveyed to subsequent ponds. The increased load to the first pond should have a negligible effect on the pond over the LOP.

The amount of potential turbidity increase through fugitive dust cannot be quantified, but is expected to be small when compared to the amount of increased turbidity that would potentially result from the increased erosion of soils. New graveled roads and well pads could contribute greater runoff than undisturbed sites. If there was increased runoff, it would lead to slightly higher peak flows, potentially increasing erosion of roadside ditches and channel banks. The increased erosion could potentially raise turbidity and salinity in streams during storm events.

Because Alternative D has a negligible effect on flow in the Green River, the alternative should not affect erosion rates along the river banks or change the distribution of sediment within the river. If surface water is withdrawn from Pariette Draw and its tributaries, the effect should be minor and could actually reduce streambank erosion. Sediment deposition or erosion within the channels would depend on many factors, but it would be expected that if the sediment load is increased and flow is decreased, there would be some deposition in the channel bottoms.

Because of the small percentage of additional sediment added under Alternative D, it should have a negligible effect on the temperature of the water in Pariette Draw or its tributaries or in the Green River.

The alternative should have negligible impacts to secondary beneficial uses such as boating, wading, or similar uses; cold water species of game fish and other cold water aquatic life; and agricultural uses

including irrigation of crops and stock watering. It is not expected that the small increase in sediment load will significantly impact boating, wading, or other similar uses in Pariette Draw and the Green River. Similarly, it is not expected that the increase in sediment load will affect the temperature in Pariette Draw or the Green River so that it could affect cold water aquatic species, or that the increase in sediment load will negatively impact the water quality for agricultural uses.

#### *4.6.1.4.1.5 Groundwater Resources*

Groundwater Depletion

Only existing permitted groundwater sources would be used for drilling, completion, or production activities related to this project. While some of this groundwater will be injected back into the groundwater, these activities would result in permanent withdrawals of groundwater (produced formation water). Under Alternative D, produced groundwater would result in total aquifer drawdown of approximately 86,744 acre-feet over a 39- to 49-year LOP or about 1,770 acre-feet per year (see **Table 4.6.1.1.1.5-1**). Assuming no recharge, this represents a 0.27 percent decrease in the estimated 31 million acre-feet of water stored in aquifers in the Uinta Basin (UDWaR 1999), which would have a negligible impact on the quantity of groundwater in the area (see **Table 4.6.1.1.1.4-1**). Locally, these withdrawals may lower the water table, which could reduce the water supply available for domestic users and reduce flow into streams and springs.

Groundwater Quality

*Deep or Confined Aquifers*

Under Alternative D, potential direct and indirect impacts to usable groundwater sources would be effectively eliminated, reduced, or mitigated through the application of required and standard stipulations and lease notices and through the guidance, regulations, BLM Onshore Oil and Gas Orders, and standard COAs discussed below; the same as for the Proposed Action. These stipulations would be the same as what would be used for the Proposed Action.

*Shallow or Alluvial Aquifers*

Under Alternative D, potential direct and indirect impacts to shallow or alluvial groundwater sources would be effectively eliminated, reduced, or mitigated through the same measures as what would be used for the Proposed Action.

The potential for contaminating shallow or alluvial aquifers under Alternative D is thought to be less than those for Alternative A because there are fewer wells under Alternative D.

*Springs*

Under Alternative D, the potential impacts to springs are the same as what would be expected for the Proposed Action; however, because there are fewer wells under Alternative D, the risk of contamination to springs is less.

### 4.6.2 Mitigation

In addition to the ACEPMs detailed in **Sections 2.2.12.3** and **2.2.12.4** and the proposed mitigation measures described in **Section 4.5.2**, the following mitigation measures could be required by BLM:

- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads will be set back a minimum of 200 feet from the active stream channel (average 3-feet wide or greater without an associated riparian zone) unless site specific analysis demonstrates that: 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain, 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.
- All new stream crossings would be kept to a minimum. In the case of an unavoidable stream crossing, culverts will be designed and constructed to allow fish passage. All stream crossings will be designed and constructed to keep impacts to riparian and aquatic habitat to a minimum.
- Before development, springs will be delineated, identified on maps, and marked in the field in order to keep impacts to springs to a minimum.
- Appropriate BMPs needed to mitigate water impacts anticipated to occur from surface disturbing activities will be identified during the onsite and may include but not be limited to: proper culvert design, installation of energy dissipation devices, proper site selection (avoidance of: steep slopes, riparian areas, wetlands, areas subject to severe soil movement, and areas of shallow groundwater and natural watercourses), and utilizing closed loop drilling.

### 4.6.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts from the each of the alternatives would include long-term reductions in available surface water and groundwater resources as a result of project withdrawals. Increased salinity and selenium concentrations in surface waters would occur under each of the alternatives due to ongoing project activities that result in erosion and sedimentation from initial or ongoing surface disturbances.

### 4.6.4 Irretrievable and Irreversible Commitments of Resources

There would be no irreversible impacts to water resources. The proposed project could result in an increased sediment load and turbidity in Pariette Draw within the MBPA due to erosion of exposed earth and increased runoff from the well pads and appurtenant facilities during all phases of the project. Because selenium, boron, and salts (TDS) are in the soil and will move as the soil is eroded, the project activity could also result in an increase in these parameters. Other potential impacts would include the following:

- Accidental spillage of potentially toxic substances resulting from direct spills of materials into a creek, pond, or canal or indirect contamination of surface water due to migration of petroleum from areas of soil contamination adjacent to surface water bodies; and
- Contamination of the alluvial groundwater sources from spills or unsealed wells.

### 4.6.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of roads, pipelines, wells, and associated facilities would provide a short-term mineral use resulting in long-term impacts to surface water and groundwater quantities available in the area. Long-term impacts to surface water and groundwater quantities are due to the consumptive use of these resources for well drilling, completion, and production. Other impacts to water resources as a result of short-term mineral use would be limited to the LOP.

## 4.7 VEGETATION

### 4.7.1 Direct and Indirect Impacts

**Table 4.7-1** summarizes the direct disturbances to vegetation communities by each alternative.

**Table 4.7-1 Direct Disturbances to Vegetation Communities by Alternative**

| Alternative | Scrub/ Shrub Dist. (acres) | Grassland/ Herbaceous Dist. (acres) | Wetland Dist. (acres) | Barren Land Cover Dist. (acres) | Previously Altered/Dist. Lands Dist. (acres) | Total Suitable Wildlife Habitat Dist. (acres) | Dist. of Existing Dev. (acres) |
|---|---|---|---|---|---|---|---|
| Alternative A (Proposed Action) | 7,977 | 1,106 | 677 | 714 | 689 | 11,163 | 4,966 |
| Alternative B (No Action) | 471 | 53 | 32 | 22 | 105 | 683 | 187 |
| Alternative C (Field-wide Electrification) | 8,092 | 1,129 | 687 | 716 | 714 | 11,338 | 4,970 |
| Alternative D (Resource Protection) | 4,627 | 584 | 349 | 296 | 247 | 6,103 | 3,702 |

#### 4.7.1.1 Alternative A – Proposed Action

Construction and operation of the proposed project under the Proposed Action would result in direct and indirect impacts to the vegetation communities in the MBPA. Direct effects to vegetation (i.e., modification of community structure, species composition, and extent of cover types) would occur from disturbance or removal of vegetation as a result of the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Indirect effects to vegetation may include short- and long-term increased potential for noxious weed invasion, exposure of soils to elevated erosion, soil compaction, and shifts in overall species composition and/or changes in plant density.

Direct impacts to agricultural lands would include conversion of cultivated crop and/or pastureland to energy-related development. Depending on the placement of well pads, linear features (roads and utility corridors), and support infrastructure on agricultural lands, the proposed development could also directly affect the usability of adjacent land for agricultural purposes.

Under the Proposed Action, agricultural lands would not be returned to agricultural use until the end of the LOP. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands (including agricultural land) to energy development purposes.

Implementation of the Proposed Action would result in the direct disturbance of approximately 16,129 acres of vegetation (see **Table 4.7.1.1-1**). This includes approximately 7,977 acres of scrub/shrubland, 1,106 acres of grassland/herbaceous, 677 acres of wetlands, 714 acres of barren land, and 5,655 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 8,321 acres of initial disturbance (52 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of the Proposed Action to approximately 7,808 acres.

**Table 4.7.1.1-1. Vegetation Communities Affected by Alternative A - Proposed Action**

| Land Cover Type | Vegetation Community | Initial (Short-Term) Disturbance (Acres) | Residual (long-term) Surface Disturbance |
|---|---|---|---|
| Scrub/Shrub | Colorado Pinyon-Juniper Woodland and Shrubland | 640 | 273 |
| | Colorado Plateau Mixed Low Sagebrush Shrubland | 2,354 | 1,066 |
| | Intermountain Basins Big Sagebrush Shrubland | 625 | 266 |
| | Intermountain Basins Mat Saltbrush Shrubland | 73 | 29 |
| | Intermountain Basins Mixed Salt Desert Scrub | 4,285 | 1,901 |
| ***Total*** | | **7,977** | **3,535** |
| Grassland/ Herbaceous | Intermountain Basins Semi-Desert Grassland | 290 | 144 |
| | Intermountain Basins Semi-Desert Shrub Steppe | 816 | 323 |
| ***Total*** | | **1,106** | **466** |
| Wetlands | Intermountain Basins Greasewood Flat | 657 | 251 |
| | Rocky Mountain Lower Montane Riparian Woodland and Shrubland | 20 | 5 |
| | North American Arid West Emergent Marsh | -- | -- |
| | Lacustrine and Riverine Deepwater Habitats | -- | -- |
| ***Total*** | | **677** | **256** |
| Barren Lands | Colorado Plateau Mixed Bedrock Canyon and Tableland | 476 | 175 |
| | Intermountain Basins Shale Badland | 238 | 75 |
| ***Total*** | | **714** | **250** |
| Altered/Disturbed Lands | Invasive Annual Grassland | 399 | 174 |
| | Invasive Southwest Riparian Woodland/Shrubland | 8 | 1 |

| Land Cover Type | Vegetation Community | Initial (Short-Term) Disturbance (Acres) | Residual (long-term) Surface Disturbance |
|---|---|---|---|
| | Agricultural Lands | 283 | 112 |
| | Existing Development | 4,966 | 3,015 |
| ***Total*** | | **5,655** | **3,301** |
| ***Grand Total*** | | **16,129** | **7,808** |

Interim reclamation for portions of the well pads and access roads not needed for production facilities/operations and facilitates would be completed within 6 months following completion of the last well planned for the pad. Pipeline ROWs would be reclaimed within 6 months of pipeline installation. Seeding of temporarily disturbed areas along roads and pipelines would be completed within 30 days following the completion of construction. Assuming these measures are effectively applied, significant impacts that relate to vegetation are not likely to occur.

The above analysis is predicated on the following assumptions: a) interim and final reclamation actions outlined in **Section 4.7.3** would be determined successful; b) ground cover would be present within 3 to 5 years on reseeded/reclaimed sites; and c) shrub species would be present in 10 to 15 years on reseeded/reclaimed sites. Of the estimated 16,129 acres of new surface disturbance associated with the Proposed Action, approximately 48 percent (7,808 acres) would remain in a disturbed condition for the estimated 41- to 51-year LOP, or longer. To date, quantifiable reclamation data in the MBPA is inconclusive as to whether current reclamation actions are proving consistently successful and whether the expectation as to the time to achieve success is appropriate. Current reclamation methods and guidance have been developed and implemented in a learning environment. If continued short- and long-term monitoring of reclamation actions is undertaken within the MBPA over the LOP and reclamation objectives and specific reclamation actions are adjusted for changing environmental conditions and ongoing uses, significant impacts to vegetation resources would be substantially minimized.

Implementation of the Proposed Action also would increase the potential for the occurrence of indirect effects. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. Noxious weeds tend to be aggressive colonists of disturbed areas where the native vegetation has been removed. Therefore, disturbances associated with construction of the proposed project could provide opportunities for noxious weeds to invade and become established. Disturbance leads to dispersal and encouragement of non-native seeds from roads and other areas by vehicles and other equipment. Invasion by non-native grasses is particularly problematic because they are capable of effective competition with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native grasses can out-compete native vegetation and eventually dominate large areas. An increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are substantially more flammable and establish in denser populations than woody and non-woody native desert vegetation. An increase in wildfire further encourages establishment of grasses because they are quicker and more capable of re-establishment after fire. If it becomes established in the MBPA, non-native grassland vegetation could potentially expand into, and ultimately displace, native desert shrub communities in adjacent areas (Brooks 1999). In addition, invasive weeds can adversely affect the visual character of an area.

In order to minimize the potential for adverse effects from invasive and noxious weed establishment, monitoring of invasive and noxious weeds could be necessary. If found, control and eradication measures would be implemented as outlined in the COAs for each APD associated with the Project. The implementation of these measures along with other recommended mitigation measures and ACEPMs detailed in **Section 2.2.12.5** would minimize the potential for adverse impacts to vegetation from noxious weeds.

Additional indirect impacts could include an increased potential for wind erosion of disturbed surfaces into adjacent areas that provide suitable habitat for this species. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in vegetation. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis (Thompson et al. 1984, Farmer 1993). However, native desert vegetation naturally experiences chronic exposure to windblown dust and is not likely to be significantly affected, except in extreme cases along travel corridors where sand loosened by excessive vehicular activities could accumulate and partially bury individuals residing in adjacent habitat. Because intensive dust creation is only expected to occur during construction, dust pollution that results from construction activities is expected to have only short-term minimal impacts on vegetation.

#### 4.7.1.1.1 Wetland Vegetation

The Proposed Action would result in the initial loss of approximately 677 acres of wetland vegetation types including approximately 20 acres of Rocky Mountain Riparian Woodlands and Shrublands and approximately 657 acres of Intermountain Basins Greasewood Flat vegetation. Following interim reclamation surface disturbance to wetland vegetation would be reduced to approximately 256 acres. Wetland areas not directly impacted by the Proposed Action may be exposed to direct impacts as a result of construction and operation activities. Wetland habitats may be subject to increased levels of sedimentation and increased potential for pollution resulting from accidental spills of petroleum products, fuels, or other chemicals. Contamination and increased sediment loads could potentially harm a wetland's ability to function properly and may result in the loss of wetland flora and fauna. Implementation of site-specific mitigation measures outlined during the APD process as well as ACEPMs for soil resources (**Section 2.2.12.3**) and health and safety/hazardous materials (**Section 2.2.12.10**) would help reduce potential direct and indirect impacts to wetland habitats within the MBPA.

### 4.7.1.2 Alternative B – No Action Alternative

Under the No Action Alternative, direct and indirect impacts to vegetation resources (including agricultural lands) within the MBPA would be similar in nature and scope as those described under the Proposed Action. However, potential impacts under the No Action Alternative would be substantially lower because only 788 new oil and gas wells would be developed within the MBPA. The overall disturbance to vegetation would be approximately 870 acres, which is 95 percent less than that of the Proposed Action (see **Table 4.7.1.2-1**).

Under the No Action Alternative, the rate at which agricultural land would not be returned to agricultural use at the end of the LOP would be substantially lower than what would be expected under the Proposed Action. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands (including agricultural land) to energy development purposes.

Implementation of the No Action Alternative would result in the direct disturbance of approximately 471 acres of scrub/shrubland, 53 acres of grassland/herbaceous, 32 acres of wetlands, 22 acres of barren land, and 292 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 211 acres of initial disturbance (24 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of the No Action Alternative to approximately 659 acres.

Correspondingly, indirect impacts including the potential for the invasion and establishment of noxious weed species; increased potential for fire; and inhibited and reduced rates of photosynthesis from increased airborne dust would be proportionally lower. For the same reasons described under the Proposed Action, indirect impacts from implementation of the No Action Alternative are expected to have only short-term, minimal impacts on vegetation.

**Table 4.7.1.2-1. Vegetation Communities Affected by Alternative B - No Action Alternative**

| Land Cover Type | Vegetation Community | Initial (Short-Term) Disturbance (Acres) | Residual (long-term) Surface Disturbance (acres) |
|---|---|---|---|
| Scrub/Shrub | Colorado Pinyon-Juniper Shrubland and Woodland | 55 | 36 |
| | Colorado Plateau Mixed Low Sagebrush Shrubland | 152 | 106 |
| | Inter-Mountain Basins Big Sagebrush Shrubland | 55 | 39 |
| | Inter-Mountain Basins Mat Saltbrush Shrubland | 2 | 1 |
| | Inter-Mountain Basins Mixed Salt Desert Scrub | 207 | 154 |
| ***Total*** | | **471** | **337** |
| Grassland/ Herbaceous | Inter-Mountain Basins Semi-Desert Grassland | 18 | 17 |
| | Inter-Mountain Basins Semi-Desert Shrub Steppe | 36 | 27 |
| ***Total*** | | **53** | **44** |
| Wetlands | Intermountain Basins Greasewood Flat | 31 | 23 |
| | Rocky Mountain Lower Montane Riparian Woodland & Shrubland | 1 | 1 |
| | North American Arid West Emergent Marsh | -- | -- |
| | Lacustrine and Riverine Deep-water Habitats | -- | -- |
| ***Total*** | | **32** | **24** |
| Barren Lands | Colorado Plateau Mixed Bedrock Canyon & Tableland | 20 | 13 |
| | Inter-Mountain Basins Shale Badland | 2 | 2 |
| ***Total*** | | **22** | **15** |
| Altered/Disturbed | Agricultural Lands | 86 | 62 |
| | Existing Development | 187 | 163 |

| Land Cover Type | Vegetation Community | Initial (Short-Term) Disturbance (Acres) | Residual (long-term) Surface Disturbance (acres) |
|---|---|---|---|
| | Invasive Annual Grassland | 19 | 14 |
| | Invasive Southwest Riparian Woodland/Shrubland | -- | -- |
| ***Total*** | | **292** | **249** |
| ***Grand Total*** | | **870** | **659** |

#### 4.7.1.2.1 Wetland Vegetation

Impacts to wetland vegetation would be similar in nature and scope to those described under the Proposed Action; although, they would be substantially less as only 32 acres of surface disturbance would occur in areas with mapped wetland vegetation. Under the No Action Alternative there would be a lower increase in erosion and subsequent sedimentation as a result of project activity. Additionally, the No Action Alternative has a lower potential for indirect impacts from accidental spills of hazardous materials than any other alternative proposed as fewer wells would be drilled. Implementation of site-specific mitigation measures outlined during the APD process as well as ACEPMs for soil resources (**Section 2.2.12.3**) and health and safety/hazardous materials (**Section 2.2.12.10**) would help reduce potential direct and indirect impacts to wetland habitats within the MBPA.

### 4.7.1.3 Alternative C – Field-Wide Electrification

Direct and indirect impacts to vegetation resources (including agricultural lands) under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations.

Under Alternative C, the rate at which agricultural land would not be returned to agricultural use at the end of the LOP would be slightly higher than what would be expected under the Proposed Action. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands (including agricultural land) to energy development purposes.

Implementation of Alternative C would result in the direct disturbance of 16,308 acres of vegetation (see **Table 4.7.1.3-1**). This includes approximately 8,092 acres of scrub/shrubland, 1,129 acres of grassland/herbaceous, 687 acres of wetlands, 716 acres of barren land, and 5,684 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 8,383 acres of initial disturbance (51 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of Alternative C to approximately 7,925 acres.

Alternative C would have the greatest potential for direct impacts to vegetation communities (including agriculture lands) among all alternatives considered because the former would have the greatest amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Correspondingly, indirect impacts including the potential for the invasion and establishment of noxious weed species; increased potential for fire; and inhibited and

reduced rates of photosynthesis from increased airborne dust would be proportionally higher. For the same reasons described under the Proposed Action, indirect impacts from implementation of Alternative C are expected to have only short-term, minimal impacts on vegetation.

**Table 4.7.1.3-1. Vegetation Communities Affected by Alternative C – Field-wide Electrification**

| Land Cover Type | Vegetation Community | Initial (Short-Term) Disturbance (Acres) | Residual (long-term) Surface Disturbance (acres) |
|---|---|---|---|
| Scrub/Shrub | Colorado Pinyon-Juniper Shrubland and Woodland | 647 | 278 |
| | Colorado Plateau Mixed Low Sagebrush Shrubland | 2,383 | 1,085 |
| | Inter-Mountain Basins Big Sagebrush Shrubland | 630 | 269 |
| | Inter-Mountain Basins Mat Saltbrush Shrubland | 74 | 29 |
| | Inter-Mountain Basins Mixed Salt Desert Scrub | 4,359 | 1,948 |
| ***Total*** | | **8,092** | **3,609** |
| Grassland/ Herbaceous | Inter-Mountain Basins Semi-Desert Grassland | 301 | 150 |
| | Inter-Mountain Basins Semi-Desert Shrub Steppe | 828 | 331 |
| ***Total*** | | **1,129** | **481** |
| Wetlands | Intermountain Basins Greasewood Flat | 667 | 256 |
| | Rocky Mountain Lower Montane Riparian Woodland & Shrubland | 20 | 6 |
| | North American Arid West Emergent Marsh | -- | -- |
| | Lacustrine and Riverine Deep-water Habitats | -- | -- |
| ***Total*** | | **687** | **262** |
| Barren Lands | Colorado Plateau Mixed Bedrock Canyon & Tableland | 478 | 176 |
| | Inter-Mountain Basins Shale Badland | 238 | 75 |
| ***Total*** | | **716** | **251** |
| Altered/Disturbed | Agricultural Lands | 300 | 122 |
| | Existing Development | 4,970 | 3,021 |
| | Invasive Annual Grassland | 405 | 178 |
| | Invasive Southwest Riparian Woodland/Shrubland | 8 | 1 |
| ***Total*** | | **5,684** | **3,322** |
| ***Grand Total*** | | **16,308** | **7,925** |

#### 4.7.1.3.1 Wetland Vegetation

Impacts to wetland vegetation under Alternative C would be similar in nature and scope to those described under the Proposed Action but would be slightly larger in magnitude as Alternative C proposes 10 more acres of surface disturbance in wetland areas. Indirect impacts to wetland vegetation such as increased sedimentation and potential for accidental spills of hazardous materials would be similar to those described under the Proposed Action as both alternatives propose a similar level of disturbance. Implementation of site-specific mitigation measures outlined during the APD process as well as ACEPMs for soil resources (**Section 2.2.12.3**) and health and safety/hazardous materials (**Section 2.2.12.10**) would help reduce potential direct and indirect impacts to wetland habitats within the MBPA.

### 4.7.1.4 Alternative D – Resource Protection Alternative

Direct and indirect impacts to vegetation resources (including agriculture lands) under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D, as 692 fewer oil and gas wells would be drilled; fewer new well pads would be constructed; and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology.

Under Alternative D, the rate at which agricultural land would not be returned to agricultural use at the end of the LOP would be lower than what would be expected under the Proposed Action. Based on the negotiated individual SUA, private landowners would be financially compensated for the conversion of their private surface lands (including agricultural land) to energy development purposes.

The overall disturbance to vegetation (including agricultural lands) under Alternative D would be 9,805 acres (see **Table 4.7.1.4-1**), which is approximately 61 percent less than that of the Proposed Action. This includes approximately 4,627 acres of scrub/shrubland, 584 acres of grassland/herbaceous, 349 acres of wetlands, 296 acres of barren land, and 3,949 acres of already altered/disturbed or developed vegetation cover types. Following construction, approximately 6,987 acres of initial disturbance (71 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance associated with the implementation of Alternative D to approximately 2,818 acres.

This alternative would have the lowest potential for direct impacts to vegetation communities among all action alternatives considered because it would have the least amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Correspondingly, indirect impacts including the potential for the invasion and establishment of noxious weed species; increased potential for fire; and inhibited and reduced rates of photosynthesis from increased airborne dust would be proportionally lower. For the same reasons described under the Proposed Action, indirect impacts from the implementation of Alternative D are expected to have short-term, minimal impacts on vegetation.

**Table 4.7.1.4-1. Vegetation Communities Affected by Alternative D – Resource Protection**

| Land Cover Type | Vegetation Community | Initial (Short-Term) Disturbance (Acres) | Residual (long-term) Surface Disturbance (acres) |
|---|---|---|---|
| Scrub/Shrub | Colorado Pinyon-Juniper Shrubland and Woodland | 366 | 88 |
| | Colorado Plateau Mixed Low Sagebrush Shrubland | 1,441 | 359 |
| | Inter-Mountain Basins Big Sagebrush Shrubland | 384 | 84 |
| | Inter-Mountain Basins Mat Saltbrush Shrubland | 38 | 7 |
| | Inter-Mountain Basins Mixed Salt Desert Scrub | 2,398 | 629 |
| ***Total*** | | **4,627** | **1,168** |
| Grassland/ Herbaceous | Inter-Mountain Basins Semi-Desert Grassland | 186 | 70 |
| | Inter-Mountain Basins Semi-Desert Shrub Steppe | 398 | 89 |
| ***Total*** | | **584** | **159** |
| Wetlands[1] | Intermountain Basins Greasewood Flat | 348 | 92 |
| | Rocky Mountain Lower Montane Riparian Woodland & Shrubland | 1 | -- |
| | North American Arid West Emergent Marsh | -- | -- |
| | Lacustrine and Riverine Deep-water Habitats | -- | -- |
| ***Total*** | | **349** | **92** |
| Barren Lands | Colorado Plateau Mixed Bedrock Canyon & Tableland | 144 | 38 |
| | Inter-Mountain Basins Shale Badland | 152 | 31 |
| ***Total*** | | **296** | **69** |
| Altered/Disturbed | Agricultural Lands | 162 | 30 |
| | Existing Development | 3,702 | 1,274 |
| | Invasive Annual Grassland | 83 | 26 |
| | Invasive Southwest Riparian Woodland/Shrubland | 2 | -- |
| ***Total*** | | **3,949** | **1,330** |
| ***Grand Total*** | | **9,805** | **2,818** |

[1] **Table 4.7.1.4-1** discloses potential impacts to vegetation types based on GIS mapping of conceptual locations for surface facilities overlain with vegetation layers. As a result, the table shows potential impacts to wetlands. However, under Alternative D, with the exception of the water collector well, no surface disturbance would occur within riparian habitats or 100-year floodplains. In addition, no wetlands would be impacted by the water collector well under Alternative D. Thus, in actuality there would be zero acres of disturbance to wetland habitats under Alternative D.

#### 4.7.1.4.1 Wetland Vegetation

Under Alternative D, impacts to wetland vegetation would be similar in scope and nature to those described under the Proposed Action; although they would be less in magnitude as Alternative D proposes 349 acres of surface disturbance. Alternative D would not result in surface disturbance within the Pariette Wetlands. This would reduce the overall impact on wetlands as this area contains high value wetland habitat. The potential for indirect impacts to wetland vegetation would be lower under Alternative D as overall surface disturbance and well counts are lower under this alternative. Implementation of site-specific mitigation measures outlined during the APD process as well as ACEPMs for soil resources (**Section 2.2.12.3**) and health and safety/hazardous materials (**Section 2.2.12.10**) would help reduce potential direct and indirect impacts to wetland habitats within the MBPA.

### 4.7.2 Mitigation

In addition to the ACEPMs detailed in **Section 2.2.12.5**, the following recommended mitigation measures could be applied to reduce direct and indirect impacts to vegetation resources:

- Mulching, soil amendments, and other state-of-the-art techniques will be used on a site-specific basis as determined necessary to assure the highest possible revegetation success.
- In areas that contain environmentally sensitive fragile soils and vegetation, the operator may be required to perform special measures such as mulching, installing erosion fencing, use of erosion fabric, etc. (per the direction of the AO) to stabilize any disturbed areas and ensure the re-establishment of long-term perennial vegetation.
- Inter-seeding (i.e., seeding into existing vegetation), secondary seeding, or staggered seeding may be used as determined necessary on a site-specific basis to accomplish specific revegetation objectives.
- Vegetation removed from short-term surface-disturbance areas would be spread over the disturbed site to capture native seed and facilitate revegetation.
- In accordance with the appropriate AO's guidance and direction, regular, qualitative and quantitative field monitoring of reclaimed areas would be conducted over the LOP to determine the effectiveness of the applied reclamation actions. Should the prescribed reclamation actions not have the desired or anticipated results, or not be moving in a direction to achieve the desired/anticipated results, revised reclamation objectives may be appropriate and additional or new reclamation methods would be implemented. Such an adaptive management approach to reclamation would ensure reclaimed areas are restored to successful pre-disturbance production levels.
- All products (such as mulches, straw bales, etc.) used for erosion control would be certified weed-free.
- Construction equipment and vehicles coming from outside of the Uinta Basin would be power-washed prior to entering the MBPA. Any construction or operational vehicles traveling between the MBPA and areas outside of the Uinta Basin would be power-washed prior to reentrance.
- Areas disturbed by project-related activities including roads, well pads, etc. with soils that are susceptible to wind erosion would be surfaced (covering of piles where appropriate, graveling or surfactants applied to roads, etc.) on a site-specific basis, as directed by the AO, to reduce fugitive

dust generated by traffic and related activities. Such treatments would also be applied as directed by the AO on local and resource roads that represent a dust problem.

- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.
- To ensure their protection under Section 404 of the Clean Water Act and EO 11990 – Protection of Wetlands, wetland evaluations and delineations would be completed for any surface disturbance locations occurring in potential wetland habitat.
- Under Alternative D, the water collector well would be sited to avoid jurisdictional wetlands.
- Under Alternative D, with the exception of Newfield's proposed water collector well, no surface disturbance would occur in riparian habitats or 100-year floodplains.
- No new surface-disturbing activities would be allowed within active floodplains, public water reserves, or 100 meters of riparian areas unless there are no practical alternatives, impacts will be fully mitigated, or the action is designed to enhance the riparian resources.
- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads will be set back a minimum of 200 feet from the active stream channel (average 3-feet wide or greater without an associated riparian zone) unless site specific analysis demonstrates that: 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain, 2) the 100-year floodplain can be demonstrated to be narrower than 200 feet in the area proposed for well location; or 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.
- All new stream crossings would be kept to a minimum. In the case of an unavoidable stream crossing, culverts will be designed and constructed to allow fish passage. All stream crossings will be designed and constructed to minimize impacts to riparian and aquatic habitat.
- Appropriate BMPs needed to mitigate water impacts anticipated to occur from surface disturbing activities will be identified during the onsite and may include, but would not be limited to: proper culvert design, installation of energy dissipation devices, proper site selection (avoidance of: steep slopes, riparian areas, wetlands, areas subject to severe soil movement, and areas of shallow groundwater and natural watercourses), and using closed-loop drilling.

### 4.7.3 Unavoidable Adverse Impacts

Removal of vegetation associated with construction and expansion of well pad sites, access roads, pipeline corridors, and other ancillary facilities is unavoidable under all alternatives. Additional unavoidable adverse impacts to vegetation under all alternatives include the increased potential for noxious weed invasion and resultant wildfire, potential loss of prime farmlands, as well as shifts in overall species composition and/or changes in plant density within the MBPA. The action alternatives pose an increased risk of accidental spills along roads and pipelines.

### 4.7.4 Irretrievable and Irreversible Commitments of Resources

Long-term disruption of agricultural activities within the MBPA could result in irretrievable impacts if the next generation is unwilling to carry on with ongoing agricultural uses at the end of the LOP. However, based on the SUAs and commitment to successfully reclaim disturbed lands within the MBPA, private landowners would be satisfactorily compensated for the long-term conversion of agricultural lands to

another use; thus, no irretrievable impacts to agricultural use would occur. Depending on the length of time needed to successfully reclaim the surface-disturbed lands in the MBPA, the cumulative impacts from the alternatives could result in irreversible impacts to agricultural use of lands within the MBPA. Opportunities to continue to use lands proposed for surface disturbance for agricultural use may be lost until the end of the LOP.

Because of their limited productivity and relatively high potential for invasion of invasive and noxious species, it is assumed that disturbed desert vegetation communities would lose at least some degree of functional value during the LOP. These communities would only become functionally active again following successful interim and final reclamation, and until such time, would be deemed irretrievable.

Due to the difficulty with removing noxious and invasive species from their introduced habitats, the invasion of these species into areas disturbed by project activities would be considered an irretrievable impact until restoration measures are completed and considered successful.

### 4.7.5 Relationship of Short-Term Uses to Long-Term Productivity

Due to slow revegetation rates and relatively low revegetation success, the proposed project would result in impacts to vegetation communities that would extend beyond construction, operation, and maintenance activities, affecting long-term ecological and anthropogenic uses of vegetation areas. For all alternatives, long-term impacts that may affect long-term productivity include the disturbance of herbaceous and shrub-dominated vegetation cover types that would require 10 to 15 years or more to recover, and the potential that populations of weedy annual species (e.g., halogeton, cheatgrass) may become established in localized areas for extended periods of time. The decrease in vegetation cover types either through direct impacts (i.e., removal of vegetation) or indirect impacts (i.e., the spread of noxious and invasive species) could impact ecological function.

## 4.8 RANGE RESOURCES

Impacts to range resources are anticipated under each of the alternatives as a result of construction and operational activities. Direct and indirect effects on grazing livestock would include (1) the direct removal of forage and subsequent reduction in livestock AUMs; (2) increased potential for disrupting livestock operations; (3) increased oil and gas development-related traffic in allotments and potential impacts to range improvements; and (4) decreased quality and quantity of forage due to potential noxious weed infestations. The nature of potential impacts on range resources would be the same under all alternatives. However, the extent of impacts would vary by alternative, based on the amount of surface disturbance that would occur.

Based on existing grazing regulations, the BLM would continue to conduct regular monitoring of the vegetative condition on the grazing allotments and would determine the proper livestock stocking rate. Should BLM determine that a grazing allotment cannot support the livestock active AUMs stated for an allotment, BLM may choose to adjust the authorized AUMs. Such an action would be outside the scope of this document and the BLM would consider such a site-specific analysis prior to adjusting any AUMs.

## 4.8.1 Direct and Indirect Effects

### 4.8.1.1 Alternative A - Proposed Action

The primary direct impact to livestock use in the MBPA is the amount of available forage lost as a result of proposed ground-disturbing actions (refer to **Section 4.7** for further discussion and analysis). Under the Proposed Action, approximately 16,129 acres of vegetation would be removed within the MBPA as a result of new surface disturbance-related activities, 15,137 acres of which would occur within portions of the six grazing allotments contained wholly or partially within the MBPA. This would result in a total loss of approximately 1,682 AUMs (see **Table 4.8.1.1-1**).

**Table 4.8.1.1-1. Amount of Forage Lost (AUMs) by Grazing Allotment in the MBPA Under Alternative A - Proposed Action**

| Grazing Allotment | Total Livestock AUMs[1] | Calculated AUMs[1] | | Alternative A – Proposed Action | | |
|---|---|---|---|---|---|---|
| | | In MBPA | Carrying Capacity (AUM/Ac) | Estimated Surface Disturbance | Estimated Forage Lost (AUMs)[2] | Percent of Total AUMs[3] |
| Antelope Powers | 4,463 | 3,905 | 9 | 5,893 | 654.8 | 14.7 |
| Castle Peak | 4,760 | 2,498 | 9 | 3,235 | 359.5 | 7.6 |
| Eightmile Flat | 4,266 | 4,262 | 9 | 3,886 | 431.8 | 10.1 |
| Little Desert | 3,804 | 166 | 9 | 191 | 21.2 | 0.6 |
| Wells Draw | 1,220 | 295 | 9 | 304 | 33.8 | 2.8 |
| Wetlands | 1,666 | 1,388 | 9 | 1,628 | 180.9 | 10.9 |
| **Total** | **20,179** | **12,514** | **--** | **15,137** | **1,682** | **□=7.8** |

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ecological site description (ESD) for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which analyzed a similar ecological site as the MBPA.

1 Refer to **Table 3.8.2-1**

2 Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 5,893 acres/9 AUMs/ac = 654.8 AUMs, etc.)

3 Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

Direct impacts from construction and production activities to grazing allotments could also include impacts to lambing areas, potential disruption of lambing periods, and increased mortality and injuries to livestock resulting from increased vehicle traffic. In addition, livestock could be displaced from preferred grazing areas, range improvements (including water sources), and range study plots by construction and production activities.

Active lambing areas could be reduced or lost due to construction and production activities that take place in or near them. In addition, noise and human presence from construction and production activities near lambing areas could result in the disturbance of lamb and ewe pairs. Ewes disturbed by construction and production activities could abandon their lambs, resulting in increased lamb mortality.

The Proposed Action could also directly affect range improvements, stock watering, and facilities related to the control of livestock movement. The number of gates to control livestock would increase with the increased level of project-related facilities and access roads. This increase, in tandem with increased traffic levels, would increase the potential for gates to be left open and livestock to get out of the allotment. Fowler and Witte (1985) found that ranches had increased labor requirements from activities, such as gathering cattle, fixing fences, closing gates, removing litter, and repairing vandalism damages that occurred during the occurrence of oil and gas development.

Additionally, the increase in the number of roads constructed to access wells within allotments and the associated use of these roads would increase the level of vehicular traffic within allotments. Although these roads would be constructed for use by Newfield's employees and contractors, they would also be used by the general public for recreation and other purposes. This increase in use would increase the potential for collisions with and harassment of livestock. The increases in traffic and road network could also cause disruptions to livestock management and increase the time and cost of these activities. The control and management of livestock could be affected as more natural barriers to livestock movement are removed and as more livestock use roads as travel routes. Benefits from additional roads would include better access to grazing allotments, water resources, grazing facilities, and livestock.

Implementation of the Proposed Action could also increase the potential for the introduction and/or spread of noxious weeds which could impact grazing resources within the MBPA. Noxious weeds are generally unpalatable to livestock, and their establishment would result in the reduction of available forage. Following surface disturbance activities, noxious weeds and invasive plant species may spread and colonize areas that typically lack or have minimal vegetation cover or areas that have been recently disturbed. Of specific concern is the species halogeton (*Halogeton glomeratus*), which is common in the area on disturbed sites. The consumption of halogeton can lead to intoxication and death in sheep and cattle (Torrell et al. 2000). The spread of halogeton in disturbed areas could lead to the loss of available native forage and increased livestock mortality.

The direct surface impacts and indirect impacts described above also have the potential to increase grazing pressure on undisturbed sections of grazing allotments. As disturbed portions of the grazing allotment become unavailable for grazing, the grazing pressure on the rest of the undisturbed portions of the allotment could increase. Depending on the seasonal timing of the disturbances, the length of time disturbed areas are unavailable, and the current grazing management, the undisturbed portions of the individual allotments potentially could be over-utilized, leading to further decreases in forage and potential reductions in stocking rates.

Impacts to rangelands under the Proposed Action would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;
- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield's Weed Control Plan (see **Section 2.2.12.5**).

Furthermore, ACEPMs detailed in **Sections 2.2.12.1.1 and 2.2.12.6**, which include the adherence to posted speed limits, maintaining the integrity of existing fences, and proper installation and regular maintenance of cattle guards would also ensure management of livestock while on their allotments.

### 4.8.1.2 Alternative B – No Action Alternative

The nature and scope of direct and indirect impacts to range resources under the No Action Alternative would be similar to those for the Proposed Action, but of less magnitude. Under the No Action Alternative, Newfield would continue to construct roads, well pads, and ancillary facilities to complete up to 788 wells, including those proposed on State and private lands or minerals, as well as those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS.

Under the No Action Alternative, approximately 870 acres of vegetation would be removed within the MBPA as a result of new surface disturbance-related activities, 792 acres of which would occur within portions of the six grazing allotments contained wholly or partially within the MBPA. This would result in a total loss of approximately 88 AUMs (see **Table 4.8.1.2-1**), which is approximately 95 percent less than what would be expected under the Proposed Action.

**Table 4.8.1.2-1. Amount of Forage Lost (AUMs) by Grazing Allotment in the MBPA Under Alternative B – No Action Alternative**

| Grazing Allotment | Total Livestock AUMs[1] | Calculated AUMs[1] | | Alternative B – No Action | | |
|---|---|---|---|---|---|---|
| | | In MBPA | Carrying Capacity (AUM/Ac) | Estimated Surface Disturbance | Forage Lost (AUMs)[2] | Percent of Total AUMs[3] |
| Antelope Powers | 4,463 | 3,905 | 9 | 166 | 18.4 | 0.5 |
| Castle Peak | 4,760 | 2,498 | 9 | 323 | 29.4 | 1.4 |
| Eightmile Flat | 4,266 | 4,262 | 9 | 202 | 28.9 | 0.5 |
| Little Desert | 3,804 | 166 | 9 | - | - | - |
| Wells Draw | 1,220 | 295 | 9 | 41 | 4.6 | 1.5 |
| Wetlands | 1,666 | 1,388 | 9 | 61 | 5.5 | 0.5 |
| **Total** | **20,179** | **12,514** | **--** | **792** | **88** | **□=0.5** |

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ESD for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which analyzed a similar ecological site as the MBPA.

1 Refer to **Table 3.8.2-1**

2 Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 166 acres/9 AUMs/ac = 18.5 AUMs, etc.)

3 Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

Other direct and indirect impacts to range resources would include: 1) increased potential for the disruption of livestock operations; 2) increased oil and gas development-related traffic in allotments and potential impacts to range improvements; and 3) decreased quality and quantity of forage due to potential noxious weed infestations. These impacts would be similar, but of a greatly reduced magnitude, to those

as described for the Proposed Action. For this reason, implementation of Alternative B is expected to have only minimal direct and indirect impacts on range resources.

### 4.8.1.3 Alternative C – Field-Wide Electrification

Direct and indirect impacts to range resources under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. Implementation of Alternative C would result in the direct disturbance of 16,308 acres of vegetation, 15,383 acres of which would occur within portions of the six grazing allotments contained wholly or partially within the MBPA (see **Table 4.8.1.3-1**). This would result in a total loss of approximately 1,709 AUMs, which is approximately 2 percent greater than what would be expected under the Proposed Action.

**Table 4.8.1.3-1. Amount of Forage Lost (AUMs) by Grazing Allotment in the MBPA Under Alternative C – Field-Wide Electrification**

| Grazing Allotment | Total Livestock AUMs[1] | Calculated AUMs[1] | | Alternative C – Field-wide Electrification | | |
|---|---|---|---|---|---|---|
| | | In MBPA | Carrying Capacity (AUM/Ac) | Estimated Surface Disturbance | Forage Lost (AUMs)[2] | Percent of Total AUMs[3] |
| Antelope Powers | 4,463 | 3,905 | 9 | 6,018 | 668.7 | 15.0 |
| Castle Peak | 4,760 | 2,498 | 9 | 3,269 | 363.2 | 6.2 |
| Eightmile Flat | 4,266 | 4,262 | 9 | 3,957 | 439.7 | 13.3 |
| Little Desert | 3,804 | 166 | 9 | 191 | 21.2 | 0.4 |
| Wells Draw | 1,220 | 295 | 9 | 304 | 33.8 | 2.8 |
| Wetlands | 1,666 | 1,388 | 9 | 1,644 | 182.7 | 9.0 |
| **Total** | **20,179** | **12,514** | **--** | **15,383** | **1,709** | **□=7.9** |

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ESD for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which an area similar to the MBPA.

1 Refer to **Table 3.8.2-1**

2 Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 6,018 acres/9 AUMs/ac = 668.7 AUMs, etc.)

3 Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

This alternative would have the greatest potential for direct and indirect impacts to range resources among all alternatives considered because it would have the greatest amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Correspondingly, impacts including an increased potential for disrupting livestock operations; increased oil and gas development-related traffic in allotments and potential impacts to range improvements; and decreased quality and quantity of forage due to potential noxious weed infestations would be proportionally higher.

As with the Proposed Action, impacts to rangelands under Alternative C would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;
- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield's Weed Control Plan (see **Section 2.2.12.5**).

In addition, ACEPMs detailed in **Sections 2.2.12.1.1 and 2.12.2.6**, which include the adherence to posted speed limits, maintaining the integrity of existing fences, and proper installation and regular maintenance of cattle guards would also ensure management of livestock while on their allotments.

#### 4.8.1.4 Alternative D – Resource Protection

Direct and indirect impacts to vegetation resources under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be less under Alternative D because 692 fewer oil and gas wells would be drilled; fewer new well pads would be constructed; and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology.

Implementation of Alternative D would result in the direct disturbance of 9,805 acres of vegetation, 9,080 acres of which would occur within portions of the six grazing allotments contained wholly or partially within the MBPA (see **Table 4.8.1.4-1**). This would result in a total loss of approximately 1,009 AUMs, which is approximately 40 percent less than that of the Proposed Action.

**Table 4.8.1.4-1. Amount of Forage Lost (AUMs) by Grazing Allotment in the MBPA Under Alternative D – Resource Protection**

| Grazing Allotment | Total Livestock AUMs[1] | Calculated AUMs[1] | | Alternative D – Resource Protection | | |
|---|---|---|---|---|---|---|
| | | In MBPA | Carrying Capacity (AUM/Ac) | Estimated Surface Disturbance | Forage Lost (AUMs)[2] | Percent of Total AUMs[3] |
| Antelope Powers | 4,463 | 3,905 | 9 | 4,302 | 478.0 | 10.7 |
| Castle Peak | 4,760 | 2,498 | 9 | 2001 | 222.3 | 4.7 |
| Eightmile Flat | 4,266 | 4,262 | 9 | 2,208 | 245.3 | 5.8 |
| Little Desert | 3,804 | 166 | 9 | 90 | 10.0 | 0.3 |
| Wells Draw | 1,220 | 295 | 9 | 122 | 13.6 | 1.1 |
| Wetlands | 1,666 | 1,388 | 9 | 357 | 39.7 | 2.4 |
| **Total** | **20,179** | **12,514** | **--** | **9,080** | **1,009** | **□= 4.1** |

Note: Existing BLM data indicates that the average carrying capacity for the MBPA is about 9 AUMs/Acre. This carrying capacity may be too optimistic in light of the current development and prolonged dry periods affecting the MBPA given the ESD for the area. For the purpose of analysis, 9 AUMs/Ac will be used as the basis for consistency between the alternatives presented in the EIS and BLM's 2012 FEIS for Gasco Energy, which analyzed a similar ecological site as MBPA.

1 Refer to **Table 3.8.2-1**

2 Forage Lost = Estimated Surface Disturbance / Calculated Carrying Capacity (e.g., Antelope Powers = 4,302 acres/9 AUMs/ac = 478 AUMs, etc.)

3 Percent of Total AUMs = Estimated Forage lost (AUMs) / Total Livestock AUMs

This alternative would have the lowest potential for direct and indirect impacts to range resources among all action alternatives considered because it would have the least amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities. Correspondingly, impacts including an increased potential for disrupting livestock operations; increased oil and gas development-related traffic in allotments and potential impacts to range improvements; and decreased quality and quantity of forage due to potential noxious weed infestations would be proportionally lower.

As with the Proposed Action, impacts to rangelands under Alternative D would be minimized as follows:

- Adherence to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b);
- Reclamation of surface disturbance associated with the proposed project;
- Implementation of alternatives in accordance with the *Green River District Reclamation Guidelines for Reclamation Plans* (BLM 2011a) and;
- Implementation of Newfield's Weed Control Plan (see **Section 2.2.12.5**).

Moreover, ACEPMs detailed in **Sections 2.2.12.1.1 and 2.2.12.6**, which include the adherence to posted speed limits, maintaining the integrity of existing fences, and proper installation and regular maintenance of cattle guards would also ensure management of livestock while on their allotments.

### 4.8.2 Mitigation

In addition to the ACEPMs detailed in **Sections 2.2.12.5** and **2.2.12.6**, as well as adherence to the various aforementioned plans for range health standards and reclamation, the following additional mitigation measures could be applied to reduce residual impacts associated with range resources:

- During the APD permitting process, surveys would be conducted to identify active range improvements, including livestock and wildlife water sources/systems, sheep lambing areas, and shearing areas in coordination with the BLM and the livestock operators. Based on the results of these surveys, no roads, well pads, construction/production facilities, or linear facilities would be placed within 200 meters of range improvements, including livestock and wildlife water sources/systems. If avoidance is not feasible, features would be relocated to an alternate location per the SMA or AO guidance. Alternate locations would be approved by the BLM on BLM administered lands, and by appropriate SMA on all other lands.
- Project activities would be coordinated to minimize conflicts with ranching operations. This would include conducting an annual meeting with the BLM and livestock operators to discuss the upcoming year's development activities, identify potential issues, and determine potential corrective actions by either the livestock permittee and/or proponent; establishing effective and frequent communication with affected permittees during the year; and scheduling project activities to minimize potential disturbance of livestock activities.
- Damage to livestock and livestock facilities would be reported as quickly as possible to the BLM and affected livestock operators.
- Operators would develop and employ prevention measures to avoid damaging fences, gates, and cattle guards, including upgrading cattle guard gate widths and load-bearing requirements.
- Speed limits would be followed and signs would be erected in active lambing/calving areas, shipping pastures, or adjacent to working corrals to warn vehicle operators.
- Project activities would adhere to the Utah BLM Rangeland Health Standards, as required by the Vernal RMP (BLM 2008b).

### 4.8.3 Unavoidable Adverse Impacts

Loss of livestock forage as a result of construction and project development would occur under all alternatives; however, the degree of loss would vary by the level of development set out in the alternatives. Because most of the affected grazing allotments in the MBPA are not intensively managed for livestock (i.e., livestock are allowed to roam freely over their assigned allotments/pastures), there remains an unavoidable increase in the risk of livestock-vehicle collision and a likely unavoidable change in livestock utilization patterns further affecting livestock forage production.

### 4.8.4 Irretrievable and Irreversible Commitments of Resources

Irretrievable impacts would include the loss of livestock forage for both the short- and long-term LOP until the disturbed sites are successfully reclaimed, (i.e., returned to pre-disturbance production levels). Irreversible impacts would include any livestock mortality resulting from livestock-vehicle collisions.

### 4.8.5 Relationship of Short-term Uses to Long-term Productivity

The short-term activities associated with the proposed oil and gas development would reduce the long-term livestock forage productivity on the involved grazing allotment for approximately 50 years. The lost long-term livestock productivity would remain for the LOP and beyond, until reclamation is determined to be successful.

## 4.9 FISH AND WILDLIFE

### 4.9.1 Direct and Indirect Impacts

#### 4.9.1.1 Alternative A – Proposed Action

##### 4.9.1.1.1 General Wildlife and Wildlife Habitats

Construction and operation of the proposed project would result in direct and indirect impacts to wildlife and wildlife habitats. The principal impacts to terrestrial wildlife likely to be associated with the Proposed Action include: (1) the loss of certain wildlife habitats due to construction activities such as earth-moving in the vicinity of proposed well pads, access roads, and pipeline corridors; (2) habitat fragmentation; (3) vehicle-related mortality, (4) displacement of some wildlife species; and (5) an increase in the potential for illegal kill and harassment of wildlife. The magnitude of impacts to wildlife and wildlife habitats would depend on a number of factors, including the type and duration of disturbance, the species of wildlife present, time of year, and implementation of mitigation measures.

Implementation of the Proposed Action would result in the direct disturbance of 11,163 acres of vegetation that serves as suitable wildlife habitat[2]. This includes approximately 7,977 acres of scrub/shrub, 1,106 acres of grassland/herbaceous, 677 acres of wetland, 714 acres of barren land vegetation cover types, and an additional 689 acres of previously altered/disturbed lands (excluding 4,966 acres for existing development). Direct disturbance to wildlife habitat includes activities such as ground surface grading and excavation, tree and shrub removal, and/or scraping of road surfaces that disturbs surface and subsurface soils. Each of these activities could effectively remove and/or degrade existing habitat, thereby reducing its availability to local wildlife populations. **Table 4.9.1.1.2-1** summarizes the direct disturbances to suitable wildlife habitat by each alternative.

[2] Although approximately 16,129 acres of vegetation would be disturbed under the Proposed Action, an estimated 4,966 acres of this total would be associated with existing development and would not be suitable as wildlife habitat.

**Table 4.9.1.1.2-1 Direct Disturbances to Suitable Wildlife Habitat by Alternative**

| Alternative | Scrub/ Shrub Dist. (acres) | Grassland/ Herbaceous Dist. (acres) | Wetland Dist. (acres) | Barren Land Cover Dist. (acres) | Previously Altered/Dist. Lands Dist. (acres) | Total Suitable Wildlife Habitat Dist. (acres) | Dist. of Existing Dev. (acres) |
|---|---|---|---|---|---|---|---|
| Alternative A (Proposed Action) | 7,977 | 1,106 | 677 | 714 | 689 | 11,163 | 4,966 |
| Alternative B (No Action) | 471 | 53 | 32 | 22 | 105 | 683 | 187 |
| Alternative C (Field-wide Electrification) | 8,092 | 1,129 | 687 | 716 | 714 | 11,338 | 4,970 |
| Alternative D (Resource Protection) | 4,627 | 584 | 349 | 296 | 247 | 6,103 | 3,702 |

Following construction, approximately 6,370 acres of initial disturbance (57 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. These areas would be revegetated with seed mixes approved by the BLM, some of which are specifically oriented to enhance wildlife use. The duration of impacts to vegetation would depend, in part, on the success of mitigation and reclamation efforts and the time needed for natural succession to return revegetated areas to pre-disturbance conditions. Grasses and forbs are expected to become established within the first several years following reclamation; however, an estimated 7 to 10 years would be required for shrub establishment and production of useable forage. Thus, under the Proposed Action, total habitat disturbance would be reduced from approximately 11,163 acres to 4,793 acres.

Permanent and temporary loss of habitat as a result of construction activities could affect some small mammal, reptile, and/or amphibian species with very limited home ranges and mobility. Although there is no way to accurately quantify these effects, the impact is likely to be moderate in the short term and be reduced over time as reclaimed areas produce suitable habitats. Most of these wildlife species would be common and widely distributed throughout the MBPA. The loss of some individuals as a result of habitat removal would have a negligible impact on populations of these species throughout the region.

Indirect effects due to displacement of wildlife also would occur as a result of construction activities associated with the proposed project. In response to the increase in human activity (e.g., equipment operation, vehicular traffic, and noise) wildlife may avoid or move away from the sources of disturbance to other habitats. This avoidance or displacement could result in underutilization of the physically unaltered habitats adjoining the disturbances. The net result would be that the value of habitats near the disturbances would be decreased and previous distributional patterns would be altered. The habitats would not support the same level of use by wildlife as before the onset of the disturbance. Additionally, some wildlife could be displaced to other habitats, which could lead to some degree of overuse and degradation to those habitats.

Public vehicle use of roads constructed to access the MBPA can have an additive, or possibly a synergistic influence on reducing wildlife use of adjacent habitats, as well as causing additional impacts.

Public access to constructed roads in the MBPA would increase the potential for mortality and general harassment of wildlife. Seasonal closures of some existing roads to public use following construction would be one of the most effective measures that could be implemented to offset this impact.

#### 4.9.1.1.2 Big Game

***Pronghorn Antelope***

The greatest direct impact to pronghorn and other big game under the Proposed Action would be direct habitat loss and fragmentation. Under the Proposed Action, 4,568 of the 5,750 proposed wells would be drilled within UDWR-designated, crucial value, year-long fawning habitat for pronghorn. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 14,403 acres scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 7,692 acres of initial disturbance (53 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long fawning habitat associated with implementation of the Proposed Action to approximately 6,711 acres.

Approximately 69 of the 5,750 proposed wells would be drilled within UDWR-designated, year-long substantial habitat for pronghorn. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 273 acres of scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA **(see Table 4.9.1.1.2-1**). Following construction, approximately 140 acres of initial disturbance (51 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to year-long substantial habitat for pronghorn associated with implementation of the Proposed Action to approximately 133 acres.

**Table 4.9.1.1.2-1. Surface Disturbances to UDWR-designated Big Game Habitats Under the Proposed Action**

| Species<br><br>Big Game Species | Habitat Type<br><br>UDWR-designated Habitat Type | Total Habitat in MBPA (Acres) | Disturbance Associated with the Proposed Action in MBPA | | |
|---|---|---|---|---|---|
| | | | Number of Proposed Wells | Initial (short-term) Surface Disturbance (acres) | Residual (long-term) Surface Disturbance (acres) |
| Pronghorn Antelope | Year-long Crucial Fawning Habitat | 109,833 | 4,568 | 14,403 | 6,711 |
| | Year-long Substantial | 1,811 | 69 | 273 | 133 |
| Mule Deer | Winter Substantial | 5,248 | 158 | 700 | 323 |
| | Year-long Substantial | 1,476 | 69 | 232 | 117 |
| | Year-long Crucial Fawning Habitat | 2,276 | 3 | 89 | 35 |

| Species<br><br>Big Game Species | Habitat Type<br><br>UDWR-designated Habitat Type | Total Habitat in MBPA (Acres) | Disturbance Associated with the Proposed Action in MBPA | | |
|---|---|---|---|---|---|
| | | | Number of Proposed Wells | Initial (short-term) Surface Disturbance (acres) | Residual (long-term) Surface Disturbance (acres) |
| Rocky Mountain Elk | Winter Substantial | 10,857 | 239 | 1,511 | 706 |
| | Year-long Crucial Calving Habitat | 7,573 | 680 | 1,011 | 480 |

Much of this surface disturbance under the Proposed Action would only occur as an expansion of existing infrastructure and in habitats that are already fragmented by past oil and gas activity. In fact, a substantial portion of the seasonal habitats for pronghorn in the MBPA are interspersed with and fragmented by existing oil and gas development (**see Figure 3.9.3.1-1 – Attachment 1**). Approximately 583 miles of roads and pipelines, 1,671 well pads, and facilities are currently located within UDWR-designated habitat for pronghorn within the MBPA. This has resulted in an estimated 5,138 acres of surface disturbance to UDWR-designated habitat for pronghorn within the MBPA. Under the Proposed Action, an additional 14,676 acres of initial surface disturbance would occur within UDWR-designated habitat for antelope (a 285 percent increase over current conditions).

In addition to the direct loss of habitat associated with the development of wells, access roads, and other facilities, disturbances from drilling activities and traffic would affect utilization of the habitat immediately adjacent to these areas. Activities associated with construction, drilling, and travel along project roadways are likely to temporarily displace pronghorn from adjacent habitats, lowering the overall habitat effectiveness of these areas. These zones are not likely to be completely abandoned by these species, but the effective use of these areas could be reduced depending on a number of factors such as time of year, social structure of individual herds, and whether populations are resident or migratory.

Some studies have documented that pronghorn are able to habituate to oil and gas activity (Segerstrom 1982, Reeve 1984, Alldredge and Deblinger 1988). Pronghorn reactions to road-related disturbances usually vary in response to traffic volumes, and the nature of the response may also depend on whether antelope are resident or migratory. Migratory populations that move into an area are likely to be more vulnerable to disturbance than resident antelope. The rate at which migratory pronghorn can adapt to disturbance related to oil and gas development over time is unknown, but the capacity of resident pronghorn to adapt to such circumstances has been demonstrated (Segerstrom 1982, Reeve 1984, Alldredge and Deblinger 1988).

Further, the level of indirect impacts to antelope as a result of traffic-related disturbance varies with the sex, season, and social structure of the individual herd. Territorial bucks are the most tolerant of vehicular activity, and does without fawns are fairly tolerant as well. Does with fawns, however, are less tolerant of vehicular activity as are nursery groups of antelope, bachelor buck groups, and mixed groups of multiple males. Time of year and social structure also has a bearing on pronghorn reactions to road-related disturbances. During late fall and into winter, pronghorn tend to aggregate in large herds and are more responsive to disturbance than during the spring and summer when populations are more fragmented and disjunctive.

Antelope are sensitive to disturbance at or near natal sites because does tend to isolate themselves for a week prior to fawning. Development in certain areas in the spring might interrupt antelope fawning. Consequently, some reduction in local antelope reproduction could result, but the degree would be dependent upon the amount of disturbance and the significance of the MBPA as a natal site.

The potential for vehicle collisions with pronghorn during the spring, summer, and fall months would be increased by a commensurate increase in vehicle traffic during construction and would continue (although at a reduced rate) throughout all phases of the well operations. Approximately 583 miles of roads currently exist within UDWR-designated habitat for pronghorn in the MBPA. Under the Proposed Action, 227 miles of new access roads would be constructed within UDWR-designated habitat for antelope (a 39 percent increase over current conditions). The increase in the number of miles of roads would lead to an increase in antelope and other big game fatalities along those roads. An expanded road network would also make the area more accessible to both legal and illegal hunting, and also deliberate and unintentional harassment of pronghorn and other big game.

Successful interim reclamation of areas not used for production activities and final reclamation efforts could re-establish some pronghorn seasonal ranges over time. In addition, ACEPMs (refer to **Section 2.2.12.7**) that include measures to reduce speeding on area roads and to prevent harassment and/or poaching of pronghorn and other big game species would further reduce potential impacts associated with the Proposed Action.

***Mule Deer***

The MBPA supports a year-round resident population of mule deer. However, only 8 percent of the MBPA is classified by the UDWR as mule deer range. Nevertheless, the greatest direct impact to mule deer under the Proposed Action would be due to direct habitat loss and fragmentation of winter substantial habitat, which includes winter concentration areas. A reduction in the amount of forage availability in these areas could preclude some individuals from accessing habitats specific to their winter migration cycles that could lead to a decrease in overall production or fitness.

Under the Proposed Action, approximately 158 of the 5,750 proposed wells would be drilled within UDWR-designated winter substantial habitat for mule deer. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 700 acres of winter substantial habitat within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 377 acres (54 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat. This would reduce the long-term disturbance to UDWR-designated winter substantial habitat for mule associated with implementation of the Proposed Action to approximately 323 acres.

Approximately 3 and 69 of the 5,750 proposed wells would be drilled within UDWR-designated, year-long, crucial fawning and year-long substantial habitat, respectively. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 89 acres of year-long crucial fawning and 232 acres of year-long substantial habitats within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 54 acres (61 percent) and 115 acres (50 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within year-long crucial fawning and year-long substantial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of the

Proposed Action to approximately 35 acres for year-long crucial fawning and 117 acres for year-long substantial habitat. None of the remaining 5,613 proposed wells and associated access roads and pipelines would be located within designated mule deer range.

Substantial value year-long habitat and year-long crucial value fawning habitat for mule deer are associated with agricultural and riparian areas within portions of the Pariette Wetlands, respectively. Proposed construction activity within both riparian and agricultural areas would be minimal. Therefore, implementation of the Proposed Action is not expected to have significant effects on direct habitat loss and the fragmentation of substantial value year-long habitat or year-long crucial value fawning habitat for mule deer.

While the extent of seasonal habitats for mule deer is limited within the MBPA, habitats for deer in the MBPA are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.2-1 – Attachment 1**). Approximately 53 miles of roads and 88 well pads are currently located within year-long crucial fawning, year-long substantial, and winter substantial habitat for mule deer within the MBPA. This has resulted in an estimated 287 acres of surface disturbance to UDWR-designated habitat for mule deer within the MBPA. Under the Proposed Action, an additional 1,021 acres of initial surface disturbance would occur within UDWR-designated habitat for mule deer (a 356 percent increase over current conditions).

Under the Proposed Action, impacts to year-long crucial fawning and year-long substantial habitat for mule deer are not expected to affect UDWR's capacity to achieve its population objectives for the Nine Mile Herd Unit because of the relatively small area involved. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant.

***Rocky Mountain Elk***

Elk occupy portions of the MBPA and surrounding region on a year-round basis. The primary limiting factors affecting elk populations that use the MBPA are winter range forage availability, displacement from crucial ranges during crucial periods as a result of human activity, and the amount of motorized use, which is a factor of road density, road management, and OHV use.

Under the Proposed Action, approximately 239 and 680 of the 5,750 proposed wells would be drilled within UDWR-designated winter substantial and year-long crucial calving habitat for elk, respectively. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 1,511 acres of winter substantial and 1,011 acres of year-long crucial calving habitats within the MBPA (see **Table 4.9.1.1.2-1**). Following construction, approximately 805 and 531 acres (53 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long crucial calving habitat, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of the Proposed Action to approximately 706 acres for winter substantial and 480 acres for year-long crucial calving habitat. None of the remaining 5,580 proposed wells and associated access roads and pipelines would be located within designated elk range.

Habitats for elk in the MBPA are interspersed with and fragmented by existing oil and gas development (see **Figure 3.9.3.3-1 – Attachment 1**). Approximately 122 miles of roads and some 326 well pads are currently located within winter substantial and year-long crucial calving habitat for elk within the MBPA. This has resulted in an estimated 998 acres of surface disturbance to UDWR-designated habitat for elk

within the MBPA. Under the Proposed Action, an additional 2,522 acres of initial surface disturbance would occur within UDWR-designated habitat for elk (a 253 percent increase over current conditions).

A reduction in the amount of forage availability in these areas and disturbance to calving areas and migration corridors could preclude some individuals from accessing habitats specific to their seasonal life cycles, which could lead to a decrease in overall production or fitness. Projected loss of habitat and connectivity under the Proposed Action will likely affect patterns of use in these areas. It is anticipated that the elk usage patterns will decrease initially in areas of development; however, once construction is completed and facilities are put into operation and subsequent human activities reduced, elk use of the area is expected to gradually increase (albeit to lower levels than that before the onset of disturbance). This is supported by Van Dyke and Klein (1996) who found that elk subjected to oil well drilling in Wyoming maintained their fidelity to seasonal and annual ranges, but were observed making use of habitat and topographic features to minimize visual contact with the disturbance and avoiding direct contact with the site of disturbance, which slightly reduced the total area of range that was used.

Construction occurring during the winter months within or near this habitat may have a greater impact than during other times of the year. Elk typically experience physiological stress during the winter, particularly gestating females because they require higher energy levels for survival and successful reproduction. The increased presence of vehicles, equipment, and human activity within the MBPA, combined with the direct removal of forage in wintering habitats, could result in increased energy expenditure by elk during severe winter periods. However, adverse impacts to elk during the winter months are unlikely to occur, because under the approved Vernal RMP (BLM 2008b), areas representing substantial and crucial winter habitats would be closed to construction and developmental activities from November 15 to April 30. However, these areas would be open to operational and maintenance activities, including associated vehicle travel, during the closed period.

The Nine Mile Herd Unit has been somewhat controlled by annual harvests. Thus far, changes in environmental factors seem to have little impact on this elk herd, and currently the population (3,150 animals) is estimated to be above the management objective (UDWR 2011). Therefore implementation of the Proposed Action is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant.

#### 4.9.1.1.3 Upland Game

The principal impacts to upland game likely to be associated with the Proposed Action include: (1) direct habitat loss and fragmentation; (3) displacement of some upland game species; (4) vehicle-related mortality; and (5) an increase in the potential for illegal kill and harassment of upland game. The magnitude of impacts to upland game and their habitats would depend on a number of factors including the type and duration of disturbance, the species of upland game present, and time of year.

Implementation of the Proposed Action would result in the direct disturbance of 11,163 acres of suitable habitat for upland game. Much of this surface disturbance would only occur as an expansion of existing infrastructure and in habitats that are already fragmented by past oil and gas activity. In fact, a substantial portion of the suitable habitats for upland game in the MBPA are interspersed with and fragmented by existing oil and gas development. Approximately 583 miles of roads and pipelines, 1,671 well pads, and facilities are currently located within MBPA. This has resulted in an estimated 5,138 acres of surface disturbance to potential habitat for upland game within the MBPA. Under the Proposed Action, an

additional 11,163 acres of initial surface disturbance would occur within suitable habitat for upland game (a 226 percent increase over current conditions).

Visual and auditory impacts related to construction, drilling, and completion activities could also lead to displacement from suitable foraging and nesting habitats (Endrulat et al. 2005). Displaced game birds could move to areas of less suitable habitat where levels of competition for resources may be higher.

Construction, drilling, and completion activities that take place during the spring or summer months could lead to decreased reproductive success, nest abandonment, or direct impacts to nest sites. Increased construction of roads and vehicle traffic within the MBPA could also lead to increased potential for vehicle collisions with upland game species. Increased access and human presence within the MBPA has the potential to increase poaching and harassment of upland game, as well as increase hunter access and success.

Although the Proposed Action may affect individuals of various upland game species, it would not be expected to adversely affect species population levels as a whole or affect UDWR's capacity to achieve its population objectives for upland game species.

#### 4.9.1.1.4 Waterfowl

Wetland habitats that include North American arid west emergent marsh and lacustrine and riverine deep-water habitats that could be used by waterfowl are found within the Pariette Wetlands ACEC and along the Green River, including the Pariette Wetlands and Green River BHCAs. These habitats are used by waterfowl for feeding, resting, and loafing and are generally located away from proposed disturbances and would not be subject to direct impacts from the implementation of the Proposed Action.

While many waterfowl species nest in upland areas, no adverse impacts to nesting waterfowl are expected as a result of direct habitat disturbance to grassland/herbaceous vegetation under this alternative because the area is not recognized as an important nesting area for waterfowl, a relatively small total area of upland habitats adjacent to wetlands are involved, and grassland/herbaceous habitats similar to those impacted are readily available in surrounding areas.

However, direct impacts to waterfowl could result from increased levels of human activity and noise in close proximity to habitats used by waterfowl. This could lead to temporary displacement or avoidance of the affected area. Displacement could also lead to increased use of adjacent habitats, which could lead to increased inter- and intra-specific competition for resources. As increased noise levels and visual disturbances associated with construction and drilling activities would be localized and short-term, displacement to adjacent habitats would likely be temporary in nature and would not likely alter the use of specific wetland habitats or productivity of current waterfowl populations within the MBPA.

Potential indirect impacts to waterfowl habitat including the BHCAs could result under the Proposed Action from increased soil erosion, sediment yield, degradation of surface water quality, and potential for spills and leaks. These impacts would be reduced with interim reclamation, recommended mitigation measures for erosion control to avoid or minimize soil erosion and off-site deposition, and spill containment measures.

#### 4.9.1.1.5 Migratory Birds

Impacts to migratory birds in the MBPA under the Proposed Action would be similar for all migratory bird species, but would vary depending on loss of habitat types (i.e., loss of vegetation communities) and species' sensitivities to disturbance. Implementation of the Proposed Action would likely have the greatest effect on those species classified as priority bird species by UPIF or the Intermountain West Joint Venture due to their small population sizes and limited distribution, or those located within the Pariette Wetlands and Green River BHCAs. For the purposes of impact analyses in this EIS, impacts to migratory birds within the MBPA are discussed together; however, estimates of surface disturbance in vegetation communities that provide habitat for migratory birds are summarized in **Section 4.7**. The direct removal or fragmentation of vegetative communities used by migratory birds would persist for the LOP, until successful reclamation is achieved. Successful reclamation, in conjunction with weed control efforts, would restore loss of nesting and foraging habitat for migratory birds over time.

The intensity of impacts from the Proposed Action on migratory birds that use the MBPA and surrounding region would largely be dependent upon seasonal timing of construction, drilling, and completion activities. If construction and drilling of the proposed well pads and wells were completed in the late summer months (i.e., August – September), many of the migratory species would have left the immediate MBPA for southern wintering grounds, or at least will have fledged and left their nests. Disturbance during this time would be temporary, and project-related impacts would not likely have an appreciable impact on migratory bird populations as a whole or individual species in general. If the proposed well construction and drilling were to occur during the peak nesting months in spring/summer, the Proposed Action could result in at least some degree of nest abandonment, direct mortality, reproductive failure, displacement of birds, and destruction of nests. This would have a greater impact on High-Priority migratory bird species that may be nesting in the MBPA due to the smaller population size and limited distribution of these species.

Construction, drilling, and completion activities, as well as production and maintenance activities, would result in the fragmentation of habitat and associated edge avoidance by migratory birds, which has been documented as leading to lower levels in productivity (Renfrew et al. 2005). Associated noise and increased human presence would cause displacement from foraging and nesting habitats. If displaced, birds could move to less suitable habitats that could cause an increase in competition and deteriorated physical condition. Increased roads and vehicle traffic levels could also lead to the increased potential for collisions between migratory birds and vehicles. However, as mentioned previously, much of the surface disturbance under the Proposed Action would only occur as an expansion of existing infrastructure and in locations where birds either already encounter visual and noise disruptions, or have previously abandoned these areas altogether.

Additionally, reserve pits have the potential to contain wastewater with salts and brines, organic chemicals, petroleum hydrocarbons, surfactants, of substances, which may pose a risk to migratory birds and other wildlife. These materials can be hazardous to birds through ingestion or loss of insulation due to residue on feathers. Although these pits are small and temporary, the simultaneous presence of large numbers of open pits on the landscape presents a potentially significant cumulative hazard to migratory birds and other wildlife. Measures to cover or net pits or tanks would be one of the most effective measures to offset this impact.

#### 4.9.1.1.6 Raptors

The principal impacts of the Proposed Action on raptors are: (1) nest desertions and/or reproductive failure caused by project-related disturbances; (2) increased public access and subsequent human disturbance resulting from new road construction; and (3) temporary reductions in prey populations. Impacts to raptors in the MBPA under the Proposed Action would generally be similar for all raptor species, but would vary depending on type of habitat impacted (i.e., type of vegetation community) and individual species' sensitivities to disturbance. Impacts would also vary depending on the seasonal timing of construction, drilling, and completion activities because some raptors are year-round residents while others are seasonal migrants present only during the breeding season or winter.

Direct impacts to raptors could result from surface-disturbing activities or areas with concentrated human activity in close proximity to an active raptor nest. This could lead to temporary displacement from nesting sites, avoidance of affected areas, and deterrence from establishing other nesting sites. Steidl and Anthony (2000) suggest that the greatest energetic costs from disturbance occur in nestlings, potentially decreasing overall reproductive success. Displacement could also lead to increased use of adjacent habitats, which could lead to increased inter- and intra-specific competition for resources. However, not all raptor species are equally as sensitive to disturbance. Some individual and breeding pairs of raptors appear relatively unperturbed by some human disturbance and human-induced impacts and continue to breed successfully amid these activities (Mathisen 1968, Bird et al. 1996). Nesting within or near human-altered environments may be a manifestation of the decreased availability of high-quality natural nest sites, which are indicative of high densities of breeding birds, suggestive of abundant or available prey, or simply a display of higher tolerance for disturbance by certain individuals or breeding pairs.

It is worth noting that much of the surface disturbance under the Proposed Action would only occur as an expansion of existing infrastructure and in habitats that are already fragmented by past oil and gas activity. In fact, a substantial portion of the MBPA is interspersed with and fragmented by existing oil and gas development. Approximately 583 miles of roads and pipelines, 1,671 well pads, and numerous facilities are currently located within the MBPA. The gradual transformation and degradation of habitats within the MBPA from past oil and gas activity is likely a contributing factor in the decline in the level and success of raptor nesting activity and subsequent loss of many historically occupied raptor nests within the MBPA. Of the 197 raptor nests identified within the MBPA, only 21 percent were active for at least some time during the period from 2006 to 2008 (BLM 2009b).

Much of the surface disturbance under the Proposed Action would occur in locations where raptors already encounter at least some degree of visual and noise disruptions. In addition, as increased noise levels and visual disturbances associated with construction and drilling activities would be localized and short-term, displacement to adjacent habitats would likely be temporary in nature and would not likely alter the productivity of current raptor populations within the MBPA. In addition, the topography (e.g., mesa tops, cliff faces, rock outcrops) in which most identified raptor nest sites are located precludes the development of proposed facilities in the immediate vicinity of these areas.

The creation of new roads outlined in the Proposed Action would increase public access to areas within the MBPA. With increased use of the MBPA by both workers and recreationists, the potential for encounters between raptors and humans would also increase and could result in increased disturbance to nests and foraging areas, vehicle collisions, and shooting incidences.

The development of proposed well pads, associated roads and pipelines, and other facilities would initially disturb an estimated 11,402 acres of potential habitat for several species of small mammals that

serve as prey items for raptors. This short-term moderate impact would affect approximately 10 percent of the MBPA and is not likely to be the determining factor in the level of use the MBPA receives by raptors because the small amount of short-term change in prey base populations created by the construction associated with the Proposed Action is minimal in comparison to the overall status of the rodent and lagomorph cycles which is controlled over the region and state by natural forces.

While prey populations on the MBPA would likely sustain some stress during the initial phase of the project, prey numbers would be expected to soon rebound to pre-disturbance levels following reclamation of approximately 51 percent of the total initial disturbance area involving pipelines, unused portions of well pads and roads, and wells that are no longer productive. Once reclaimed, these areas will likely promote an increased density and biomass of small mammals that is comparable to those of undisturbed areas (Hingtgen and Clark 1984). For these reasons, implementation of the Proposed Action is not expected to produce any appreciable long-term negative changes to the raptor prey base within the MBPA.

Prior to any new surface disturbance, formal raptor surveys would be conducted to search for possible undocumented nests and provide needed information on the current activity status of nests on and adjacent to the MBPA. The surveys would be conducted by a BLM-approved biologist in all areas scheduled for construction. If an occupied nest is found, construction would be postponed until after the young have fledged and left the nest, generally accepted to be August 31 (refer to ACEPM in **Section 2.2.12.7**). Newfield could also implement all raptor-specific BMPs outlined within the Vernal Field Office RMP.

Consideration of topography and vegetative screening when locating well pads and project-related facilities could further reduce or minimize indirect impacts to raptor species within the MBPA. Successful interim reclamation of areas not used for production activities, as well as final reclamation efforts, could reestablish some raptor and prey habitat over time. Measures to reduce speeding and removal of carrion on area roads could reduce direct impacts to raptors associated with the Proposed Action.

#### 4.9.1.2 Alternative B – No Action Alternative

##### 4.9.1.2.1 General Wildlife and Wildlife Habitats

Direct and indirect impacts to general wildlife and wildlife habitats within the MBPA under the No Action Alternative would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts under the No Action Alternative would be substantially lower because only 788 new oil and gas wells would be developed within the MBPA. This includes proposed wells on state and private lands, as well as those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS.

Implementation of Alternative B would result in the direct disturbance of 683 acres of vegetation that serves as suitable wildlife habitat[3], which is 95 percent less than that of the Proposed Action. This includes approximately 471 acres of scrub/shrub, 53 acres of grassland/herbaceous, 32 acres of wetland, 22 acres of barren land vegetation cover types, and an additional 105 acres of altered/disturbed lands

[3] Although approximately 870 acres of vegetation would be disturbed under the No Action Alternative, an estimated 187 acres of this total would be associated with existing development and would not be suitable as wildlife habitat.

(excluding 187 acres of existing development). Following construction, approximately 187 acres of initial disturbance (27 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. What remains after successful interim reclamation would be a long-term disturbance of approximately 496 acres, or 0.4 percent of the MBPA for the estimated 28- to 38-year LOP.

#### 4.9.1.2.2 Big Game

As with the Proposed Action, the principal direct impacts to big game species under Alternative B would include direct habitat loss resulting in decreased forage availability; displacement from crucial ranges during crucial periods as a result of increased human activity; and an increase in the potential for vehicle collisions and illegal kill and harassment of big game. The magnitude of these impacts to would depend on a number of factors including the type and duration of disturbance, the species of big game present, time of year, and implementation of recommended and required mitigation measures.

***Pronghorn Antelope***

Under Alternative B, 96 of the 788 proposed wells would be drilled within UDWR-designated, crucial value, year-long fawning habitat for pronghorn. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 656 acres of year-long scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.2.2-1**). Following construction, approximately 145 acres of initial disturbance (22 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long fawning habitat associated with implementation of the No Action Alternative to approximately 511 acres. No UDWR-designated, year-long substantial habitat for pronghorn would be impacted under Alternative B.

Under Alternative B, impacts to year-long crucial fawning habitat for pronghorn is not expected to affect UDWR's capacity to achieve its population objectives for the Nine Mile Herd Unit because of the relatively small area involved. For the same reasons, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant.

***Mule Deer***

Under Alternative B, approximately 16 and 18 of the 788 proposed wells would be drilled within UDWR-designated winter substantial and year-long substantial habitat, respectively. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 55 acres of winter substantial and 66 acres of year-long substantial habitats within the MBPA (see **Table 4.9.1.2.2-1**). Following construction, approximately 18 (33 percent) and 20 acres (30 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long substantial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of the No Action Alternative to approximately 37 acres for winter substantial and 46 acres for year-long substantial habitat. Less than 1 acre of disturbance would occur within year-long crucial fawning habitat for mule deer.

**Table 4.9.1.2.2-1. Surface Disturbances to UDWR-designated Big Game Habitats Under Alternative B - No Action Alternative**

| Big Game Species | UDWR-designated Habitat Type | Total Habitat in MBPA (Acres) | Disturbance Associated with the No Action Alternative in the MBPA | | |
|---|---|---|---|---|---|
| | | | Number of Proposed Wells | Initial (short-term) Surface Disturbance (acres) | Residual (long-term) Surface Disturbance (acres) |
| Pronghorn Antelope | Year-long Crucial Fawning Habitat | 109,833 | 96 | 656 | 511 |
| | Year-long Substantial | 1,811 | -- | -- | -- |
| Mule Deer | Winter Substantial | 5,248 | 16 | 55 | 37 |
| | Year-long Substantial | 1,476 | 18 | 66 | 46 |
| | Year-long Crucial Fawning Habitat | 2,276 | -- | < 1 | < 1 |
| Rocky Mountain Elk | Winter Substantial | 10,857 | -- | 61 | 53 |
| | Year-long Crucial Calving Habitat | 7,573 | 30 | 104 | 69 |

Under the No Action Alternative, impacts to UDWR-designated seasonal habitat for mule deer are not expected to affect UDWR's capacity to achieve its population objectives for the Nine Mile Herd Unit because of the relatively small area involved. For the same reasons, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for mule deer under this alternative.

***Rocky Mountain Elk***

Under Alternative B, approximately 30 of the 788 proposed wells would be drilled within UDWR-designated, year-long crucial calving habitat for elk. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 61 acres of winter substantial and 104 acres of year-long crucial calving habitats within the MBPA (refer to **Table 4.9.1.2.2-1**). Following construction, approximately 8 acres (13 percent) and 35 acres (34 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long crucial calving habitat, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of the No Action Alternative to approximately 53 acres for winter substantial and 69 acres for year-long crucial calving habitat.

Additionally, the population is estimated to be above the management objective. Therefore, implementation of the No Action Alternative is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions

and poaching/harassment impacts are expected to be minimal and non-significant for elk under this alternative.

#### 4.9.1.2.3 Upland Game

Direct and indirect impacts to upland game species under the No Action Alternative would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts under the No Action Alternative would be substantially lower considering that 4,972 fewer new oil and gas wells would be developed, 537.5 fewer miles of roads and pipelines would be constructed, and 50 fewer central facilities would be built than under the Proposed Action.

#### 4.9.1.2.4 Waterfowl

Direct and impacts to waterfowl under the No Action Alternative would be similar in nature and scope to those discussed under the Proposed Action; however, in comparison, the magnitude of impacts related to direct habitat loss and displacement to waterfowl would be considerably less under the No Action Alternative.

#### 4.9.1.2.5 Migratory Birds

Direct and indirect impacts to migratory birds under the No Action Alternative would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts under the No Action Alternative would be substantially lower considering that 4,972 fewer new oil and gas wells would be developed, 537.5 fewer miles of roads and pipelines would be constructed, and 50 fewer central facilities would be built than under the Proposed Action. As with the Proposed Action, the intensity of impacts from on migratory birds that use the MBPA and surrounding region would largely be dependent upon seasonal timing of construction, drilling, and completion activities.

#### 4.9.1.2.6 Raptors

As with the Proposed Action, the principal direct and indirect impacts to raptors under the No Action Alternative would include an increased potential for nest desertions and/or reproductive failure caused by project-related disturbances; increased human disturbance resulting from new road construction; and temporary reductions in prey populations. The nature and scope of these impacts would generally be similar to those described for the Proposed Action, but the magnitude of impacts would be substantially lower, as approximately 10,480 fewer acres of suitable habitat for prey species would be disturbed under the No Action as compared to those under the Proposed Action. This alternative would therefore have the lowest potential for impacts to raptors of any alternative considered.

### 4.9.1.3 Alternative C – Field-Wide Electrification

#### 4.9.1.3.1 General Wildlife and Wildlife Habitats

Direct and indirect impacts to general wildlife and wildlife habitats under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. This alternative would have the greatest potential for direct and indirect impacts to general wildlife and wildlife habitats among all alternatives considered because it would have the greatest amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities.

Implementation of the Alternative C would result in the direct disturbance of 11,338 acres of vegetation that serves as suitable wildlife habitat[4], which is 1.02 percent greater than that of the Proposed Action. This includes approximately 8,092 acres of scrub/shrub, 1,129 acres of grassland/herbaceous, 687 acres of wetland, 716 acres of barren land vegetation cover types, and an additional 714 acres of previously altered/disturbed lands (excluding 4,970 acres of existing development). Following construction, approximately 6,434 acres of initial disturbance (57 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. What remains after successful interim reclamation would be a long-term disturbance of approximately 4,904 acres, or 4 percent of the MBPA for the estimated 41- to 51-year LOP.

#### 4.9.1.3.2 Big Game

As with the Proposed Action, the principal direct impacts to big game species under Alternative C would include direct habitat loss resulting in decreased forage availability; displacement from crucial ranges during crucial periods as a result of increased human activity; and an increase in the potential for vehicle collisions and illegal kill and harassment of big game. The magnitude of these impacts would generally be identical to those under the Proposed Action and to would depend on a number of factors including the type and duration of disturbance, the species of big game present, time of year, and implementation of recommended and required mitigation measures.

***Pronghorn Antelope***

Under Alternative C, approximately 5,310 of the 5,750 proposed wells would be drilled within UDWR-designated, crucial value, year-long fawning habitat for pronghorn. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 14,967 acres of year-long scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.3.2-1**). Following construction, approximately 7,846 acres of initial disturbance (52 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long fawning habitat associated with implementation of Alternative C to approximately 7,121 acres.

Approximately 85 of the 5,750 proposed wells would be drilled within UDWR-designated, year-long substantial habitat for pronghorn. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 287 acres of scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.3.2-1**). Following construction, approximately 138 acres of initial disturbance (48 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to year-long substantial habitat for pronghorn associated with implementation of Alternative C to approximately 149 acres.

Similar to the Proposed Action, Under Alternative C, the post-reclamation carrying capacity on the UDWR-designated habitats for pronghorn antelope would be reduced by approximately 21 animals or by 2.7 percent of the overall population objective for the Nine Mile Herd Unit. Since there are no accurate determinations of pronghorn carrying capacity within the MBPA is not possible to accurately assess whether or not the 2.7 percent reductions of the carrying capacity for year-long crucial fawning and year-

[4] Although approximately 16,308 acres of vegetation would be disturbed under Alternative C, an estimated 4,970 acres of this total is associated with existing development and is suitable as wildlife habitat.

long substantial habitat for pronghorn within the will significantly affect UDWR's capacity to achieve its population objectives. The loss of 2.7 percent post-reclamation carrying capacity in year-long crucial fawning and year-long substantial habitat for pronghorn would make the achievement of UDWR's objectives more difficult and challenging.

For the same reasons as described under the Proposed Action, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for pronghorn antelope under this alternative.

***Mule Deer***

Under Alternative C, approximately 263 and 111 of the 5,750 proposed wells would be drilled within UDWR-designated winter substantial and year-long substantial habitat, respectively. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 720 acres of winter substantial and 244 acres of year-long substantial habitats within the MBPA (see **Table 4.9.1.3.2-1**). Following construction, approximately 371 (52 percent) and 129 acres (53 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long substantial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of the Alternative C to approximately 349 acres for winter substantial and 115 acres for year-long substantial habitat.

**Table 4.9.1.3.2-1. Surface Disturbances to UDWR-designated Big Game Habitats Under Alternative C - Field-Wide Electrification**

| Big Game Species | UDWR-designated Habitat Type | Total Habitat in MBPA (Acres) | Disturbance Associated with Alternative C in the MBPA | | |
|---|---|---|---|---|---|
| | | | Number of Proposed Wells | Initial (short-term) Surface Disturbance (acres) | Residual (long-term) Surface Disturbance (acres) |
| Pronghorn Antelope | Year-long Crucial Fawning Habitat | 109,833 | 5,310 | 14,967 | 7,121 |
| | Year-long Substantial | 1,811 | 85 | 287 | 149 |
| Mule Deer | Winter Substantial | 5,248 | 263 | 720 | 349 |
| | Year-long Substantial | 1,476 | 111 | 244 | 115 |
| | Year-long Crucial Fawning Habitat | 2,276 | 28 | 109 | 38 |
| Rocky Mountain Elk | Winter Substantial | 10,857 | 457 | 1,714 | 807 |
| | Year-long Crucial Calving Habitat | 7,573 | 400 | 1,012 | 513 |

Approximately 28 of the 5,750 proposed wells would be drilled within UDWR-designated, year-long crucial fawning habitat for mule deer. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 109 acres of year-long crucial fawning habitat within the MBPA (see **Table 4.9.1.3.2-1**). Following construction, approximately 71 (65 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat. This would reduce the long-term disturbance to UDWR-designated, year-long crucial fawning habitat for mule associated with implementation of Alternative C to approximately 38 acres.

***Rocky Mountain Elk***

Under the Alternative C, approximately 457 and 400 of the 5,750 proposed wells would be drilled within UDWR-designated winter substantial and year-long crucial calving habitat for elk, respectively. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 1,714 acres of winter substantial and 1,012 acres of year-long crucial calving habitats within the MBPA (refer to **Table 4.9.1.3.2-1**). Following construction, approximately 907 (53 percent) and 499 acres (49 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long crucial calving habitat, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of Alternative C to approximately 807 acres for winter substantial and 513 acres for year-long crucial calving habitat.

The Nine Mile Her Unit population is estimated to be above the management objective. Therefore implementation of Alternative C is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant for elk under this alternative.

#### 4.9.1.3.3 Upland Game

Direct and indirect impacts to upland game species under Alternative C would be nearly identical to those described for the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations.

#### 4.9.1.3.4 Waterfowl

Direct and impacts to waterfowl under the Alternative C would be nearly identical in nature, scope, and magnitude as those for the Proposed Action.

#### 4.9.1.3.5 Migratory Birds

Direct and indirect impacts to migratory birds under the Alternative C would be nearly identical in nature, scope, and magnitude as those for the Proposed Action, except that under Alternative C, there would be an increased risk of bird collisions with power lines. While collisions with power lines are a well-documented source of mortality for many migratory bird species, it is difficult to extrapolate collision risk from one power line study and apply or compare it with other studies because of site-specific conditions and the lack of standard study methods, which result in variability of reported mortality rates. Species of

birds reported to be susceptible to collisions generally have a large body size, long wing span, heavy body, and poor maneuverability. Flight behavior and other biological attributes contribute to species risk (Avian Power Line Interaction Committee [APLIC] 2012).

However, collision impacts are expected to be minimal and non-significant under this alternative because design and engineering strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

#### 4.9.1.3.6 Raptors

As with the Proposed Action, the principal direct and indirect impacts to raptors under Alternative C would include an increased potential for nest desertions and/or reproductive failure caused by project-related disturbances; increased human disturbance resulting from new road construction; and temporary reductions in prey populations. The scope and magnitude of these impacts would be nearly identical to those described for the Proposed Action.

Additionally, new power lines used to serve facilities and wells under Alternative C would pose an increased risk of electrocution and collision hazard to raptors. Electrocution is a well-documented source of mortality for raptors and the vast majority of electrocutions involve electric distribution lines rather than high voltage transmission lines (APLIC 2006). Potential impacts from increased risk of electrocution would be mitigated by designing poles according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). In addition, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

### 4.9.1.4 Alternative D – Resource Protection

#### 4.9.1.4.1 General Wildlife and Wildlife Habitats

Direct and indirect impacts to general wildlife and wildlife habitats under Alternative D would be similar in nature and scope to those described for the Proposed Action. However, the magnitude of potential impacts would be considerably less under Alternative D, as 692 fewer oil and gas wells would be drilled; fewer new well pads would be constructed; and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology. This alternative would have the lowest potential for direct and indirect impacts to general wildlife and wildlife habitats among all action alternatives considered because it would have the least amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities.

Implementation of the Alternative D would result in the direct disturbance of 6,103 acres of vegetation that serves as suitable wildlife habitat[5], which is nearly half (55 percent) that of the Proposed Action. This includes approximately 4,627 acres of scrub/shrubland, 584 acres of grassland/herbaceous, 349 acres of wetlands, 296 acres of barren land, and 247 acres of altered or disturbed (including 3,702 acres of existing disturbance) vegetation cover types. Following construction, approximately 4,559 acres of initial disturbance (75 percent) associated with construction of proposed well pad, portions of the access road,

[5] Although approximately 9,805 acres of vegetation would be disturbed under Alternative D, an estimated 3,702 acres of this total is associated with existing development and is not suitable as wildlife habitat.

and pipeline ROW not needed for operational purposes would be reclaimed. What remains after successful interim reclamation would be a long-term disturbance of approximately 1,544 acres, or 1.3 percent of the MBPA for the estimated 39- to 49-year LOP.

#### 4.9.1.4.2 Big Game

As with the Proposed Action, the principal direct impacts to big game species under Alternative D would include direct habitat loss resulting in decreased forage availability; displacement from crucial ranges during crucial periods as a result of increased human activity; and an increase in the potential for vehicle collisions and illegal kill and harassment of big game. However, the magnitude of potential impacts would be the lowest among all action alternatives considered because it would have the least amount of surface disturbance associated with the construction and expansion of well pad sites, access roads, pipeline corridors, and other facilities.

***Pronghorn Antelope***

Under Alternative D, approximately 3,329 of the 5,058 proposed wells would be drilled within UDWR-designated, crucial value, year-long fawning habitat for pronghorn. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 8,960 acres of year-long scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.4.2-1**). Following construction, approximately 6,428 acres of initial disturbance (72 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to pronghorn crucial value, year-long fawning habitat associated with implementation of Alternative D to approximately 2,532 acres.

**Table 4.9.1.4.2-1. Surface Disturbances to UDWR-designated Big Game Habitats Under Alternative D – Resource Protection**

| Big Game Species | UDWR-designated Habitat Type | Total Habitat in MBPA (Acres) | Disturbance Associated with Alternative D in the MBPA | | |
|---|---|---|---|---|---|
| | | | Number of Proposed Wells | Initial (short-term) Surface Disturbance (acres) | Residual (long-term) Surface Disturbance (acres) |
| Pronghorn Antelope | Year-long Crucial Fawning Habitat | 109,833 | 3,329 | 8,960 | 2,532 |
| | Year-long Substantial | 1,811 | 48 | 181 | 149 |
| Mule Deer | Winter Substantial | 5,248 | 111 | 396 | 109 |
| | Year-long Substantial | 1,476 | 11 | 121 | 33 |
| | Year-long Crucial Fawning Habitat | 2,276 | 48 | 14 | 6 |
| Rocky | Winter Substantial | 10,857 | 456 | 1,278 | 353 |

| Big Game Species | UDWR-designated Habitat Type | Total Habitat in MBPA (Acres) | Disturbance Associated with Alternative D in the MBPA | | |
|---|---|---|---|---|---|
| | | | Number of Proposed Wells | Initial (short-term) Surface Disturbance (acres) | Residual (long-term) Surface Disturbance (acres) |
| Mountain Elk | Year-long Crucial Calving Habitat | 7,573 | 167 | 553 | 171 |

Approximately 48 of the 5,058 proposed wells would be drilled within UDWR-designated, year-long substantial habitat for pronghorn. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 181 acres of scrub/shrub, grassland/herbaceous, and barren land habitats within the MBPA (see **Table 4.9.1.1.3-1**). Following construction, approximately 32 acres of initial disturbance (18 percent) associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. This would reduce the long-term disturbance to year-long substantial habitat for pronghorn associated with implementation of Alternative D to approximately 149 acres.

For the same reasons as described under the Proposed Action, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for pronghorn antelope under this alternative.

***Mule Deer***

Under Alternative D, approximately 111 and 11 of the 5,058 proposed wells would be drilled within UDWR-designated winter substantial and year-long substantial habitat, respectively. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 396 acres of winter substantial and 121 acres of year-long substantial habitats within the MBPA (see **Table 4.9.1.4.2-1**). Following construction, approximately 287 (72 percent) and 88 acres (73 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long substantial habitat, respectively. This would reduce the long-term disturbance to UDWR-designated mule deer habitat associated with implementation of Alternative D to approximately 109 acres for winter substantial and 33 acres for year-long substantial habitat.

Under Alternative D, approximately 48 of the 5,058 proposed wells would be drilled within UDWR-designated, year-long, crucial fawning habitat for mule deer. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 14 acres of year-long crucial fawning habitat within the MBPA (see **Table 4.9.1.4.2-1**). Following construction, approximately 8 acres (57 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial habitat. This would reduce the long-term disturbance to UDWR-designated, year-long, crucial fawning habitat for mule associated with implementation of Alternative D to approximately 6 acres.

Similar to the Proposed Action, impacts to UDWR-designated seasonal habitat for mule deer under Alternative D, is not expected to affect UDWR's capacity to achieve its population objectives for the

Nine Mile Herd Unit because of the relatively small area involved. For the same reasons, disturbance effects, vehicle collisions, and poaching/harassment impacts are expected to be minimal and non-significant for mule deer under this alternative.

***Rocky Mountain Elk***

Under Alternative D, approximately 456 and 167 of the 5,058 proposed wells would be drilled within UDWR-designated winter substantial and year-long crucial calving habitat for elk, respectively. The development of these wells along with associated road and pipeline installation would initially result in the direct short-term loss of approximately 1,278 acres of winter substantial and 553 acres of year-long crucial calving habitats within the MBPA (refer to **Table 4.9.1.4.2-1**). Following construction, approximately 925 (72 percent) and 382 acres (69 percent) of initial disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed within winter substantial and year-long crucial calving habitat, respectively. This would reduce the long-term disturbance to UDWR-designated elk habitat associated with implementation of Alternative D to approximately 353 acres for winter substantial and 171 acres for year-long crucial calving habitat.

The population in the Nine Mile Herd Unit is estimated to be above the management objective. Therefore implementation of Alternative D is not expected to affect UDWR's capacity to achieve its population objectives for elk within the Nine Mile Herd Unit. For the same reasons, vehicle collisions and poaching/harassment impacts are expected to be minimal and non-significant for elk under this alternative.

#### 4.9.1.4.3 Upland Game

Direct and indirect impacts to upland game species under Alternative D would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts would be considerably less under Alternative D, as 692 fewer oil and gas wells would be drilled; fewer new well pads would be constructed; and the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology. This alternative would therefore have the lowest potential for impacts to upland game of any action alternative considered because approximately 6,324 fewer acres would initially be disturbed under Alternative D as compared to those under the Proposed Action.

#### 4.9.1.4.4 Waterfowl

Direct and impacts to waterfowl under the Alternative D would be similar in nature and scope to those discussed under the Proposed Action; however, in comparison, the magnitude of impacts related to direct habitat loss and displacement to waterfowl would be considerably less under Alternative D because of restrictions on development resulting in lower surface disturbance (i.e., no new surface disturbance or well pad expansions would be allowed on federal lands within the Pariette Wetlands ACEC).

#### 4.9.1.4.5 Migratory Birds

Direct and indirect impacts to migratory birds under Alternative D would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts under Alternative D would be substantially lower because 692 fewer oil and gas wells would be drilled; fewer new well pads would be constructed; the amount of new surface disturbance would be minimized through

the increased use of multi-well pads and directional drilling technology; and no new surface disturbance or well pad expansions would be allowed on federal lands within the Pariette Wetlands ACEC. This alternative would therefore have the lowest potential for impacts to migratory birds of any action alternative considered, as approximately 6,324 fewer acres would initially be disturbed under Alternative D as compared to those under the Proposed Action. Thus, under this alternative, project-related impacts would not likely have an appreciable impact on migratory bird populations as a whole or individual species in general.

#### 4.9.1.4.6 Raptors

As with the Proposed Action, the principal direct and indirect impacts to raptors under Alternative D would include an increased potential for nest desertions and/or reproductive failure caused by project-related disturbances; increased human disturbance resulting from new road construction; and temporary reductions in prey populations. The nature and scope of these impacts would generally be similar to those described for the Proposed Action, but the magnitude of impacts would be substantially lower because approximately 5,060 fewer acres of suitable habitat for prey species would be disturbed initially under Alternative D as compared to those under the Proposed Action.

### 4.9.2 Mitigation

In addition to the ACPEMs detailed in **Section 2.2.12.7**, as well as compliance with wildlife stipulations outlined in the Vernal RMP (BLM 2008b) and BLM Onshore Order #7, the following mitigation measures could be applied to reduce some residual direct and indirect impacts to wildlife in the MBPA:

- Proposed wells and roads located within pinyon-juniper woodland-dominated habitat would be sited, whenever possible, to reduce the amount of disturbance to mule deer foraging habitat.
- All proposed roads and well pads would be sited as far from permanent water sources as possible.
- All open exhaust stacks would be capped with screen cones to exclude their use by birds and bats.
- All open pits or tanks containing liquids would be covered or netted to exclude their use by birds, bats, and other wildlife.
- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.
- Exploration, drilling, and other development activity would not be conducted within crucial elk calving and deer fawning habitat from May 15 to June 30.
- A Worker Environmental Awareness Program will be implemented for construction and drilling crews prior to the commencement of the project activities. Training materials and briefings will include, but is not be limited to, discussion of the Federal ESA, the consequences of noncompliance with this Act, identification and values of wildlife and natural plant communities, threatened and endangered species within the MBPA, hazardous substance spill prevention and containment measures, and review of all required and recommended mitigation measures.

### 4.9.3 Unavoidable Adverse Impacts

Adverse impacts to fish and wildlife species would occur under all of the alternatives to varying degrees, depending on the number of wells. Of the adverse impacts described above, the following impacts would be unavoidable:

- Long-term losses of habitat for general wildlife, big game, upland game species, migratory birds, raptors, and other wildlife.
- Fragmentation of wildlife habitat by roads that include a reduction in the size of contiguous roadless habitat areas.
- Displacement of wildlife species during construction of roads, wells, pipelines, and ancillary features, as well as during well drilling and completion activities.

### 4.9.4 Irretrievable and Irreversible Commitments of Resources

Any losses of important habitat for wildlife species would be irretrievable until disturbed areas were actively and adequately restored. The fragmentation of wildlife habitat would be irretrievable until these features were removed and reclaimed following project completion. Wildlife mortality due to project activities would be an irreversible impact. Further, any contamination of wildlife or wildlife habitat would be irretrievable until remediated.

### 4.9.5 Relationship of Short-term Uses to Long-Term Productivity

Construction of roads, well pads, pipelines, and other facilities would provide a short-term use that would result in long-term loss and fragmentation of wildlife habitat. Indirect effects resulting from increased traffic, as well as legal and illegal hunting would also have long-term negative impacts on the habitat suitability and productivity of wildlife species in the MBPA. These impacts would decrease the long-term productivity of wildlife habitat within the MBPA, but would not eliminate it.

## 4.10 SPECIAL STATUS SPECIES AND STATE SPECIES OF CONCERN

### 4.10.1 Direct and Indirect Effects

In general, construction and operational impacts on special status fish and wildlife species and their habitats would be similar to those discussed in the preceding sections for vegetation communities (**Section 4.7.1**) and wildlife (**Section 4.9.1**). However, these impacts can be more severe for special status plant, fish and wildlife species (including those listed as threatened or endangered under the ESA of 1973, as amended; BLM sensitive species; species proposed for listing; species of special concern; other USFWS or BLM species identified as unique or rare; other UDWR or UNHP species designated as unique or rare), if present, since the distribution and abundance of many of these species are limited in the MBPA and surrounding region. An adverse impact to special status species would be considered to occur if construction and/or operation of any component of the proposed project would cause substantial changes to the existing abundance, distribution, pollinators, or habitat value for a special status plant, fish or wildlife species.

### 4.10.1.1 Alternative A – Proposed Action

#### 4.10.1.1.1 Species Listed as Federally Threatened, Endangered, or Proposed

The following section describes the anticipated effects of various project components and activities associated with the Proposed Action on federally listed, proposed, and candidate species carried forward for evaluation. The magnitude and nature of effects resulting from implementation of the Proposed Action is assessed for the species relative to existing conditions in terms of whether these effects are expected to appreciably reduce likelihood of species survival and recovery. Conclusions regarding the effects of the Proposed Action on the species, as well as a determination of effect (***no effect***; ***may affect, is not likely to adversely affect***; ***may affect, is likely to adversely affect***; ***is likely to jeopardize proposed species/adversely modify proposed critical habitat***; and ***is not likely to result in a trend towards federal listing of the species***) is presented in the conclusions and determination section at the end of the analysis for the species.

***Western Yellow-billed Cuckoo***

The WYBC is an obligate riparian species that nests and forages in cottonwood-willow woodlands with a dense sub-canopy. While there is a low potential for the species to occur within the MBPA, their presence within the area cannot be entirely discounted. Riparian habitat that could be used by the WYBC occurs on the eastern edge of the MBPA along the Green River and within isolated portions of Pariette Draw.

The Proposed Action would include the long-term surface disturbance of approximately 19 acres of Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation, which serves as potential nesting and foraging habitat for cuckoo. If development or production activities were to occur during the cuckoo's breeding season (March through July), direct impacts could result in loss of nests, eggs, or young, or the disruption of breeding activities for that season.

These habitat areas are located within the 100-year floodplain of Pariette Draw and the Green River in the extreme northeastern corner of the MBPA. Under existing regulations, guidelines, and ACEPMs, well pads and associated roads and pipelines would be located to avoid or minimize impacts in riparian areas and the 100-year floodplain of Pariette Draw and the Green River, and appropriate erosion control and revegetation measures would be employed.

Indirect impacts to the species include displacement due to increased human presence in the area and associated increased noise, traffic, dust, and increased invasion of non-native plants into suitable habitat. Invasion of riparian habitats by aggressive non-native species, particularly tamarisk (*Tamarix* species), would adversely impact the species. Other potential indirect impacts to the species include decreased water quality, and degradation of riparian vegetation due to erosion and sedimentation associated with surface disturbance.

ACEPMs would reduce direct impacts to suitable habitat and eliminate direct impacts to individual birds; therefore, implementation of the Proposed Action ***is not likely to result in a trend towards federal listing of the species***.

***Colorado River Fish Species***

Construction and operation of the proposed MBPA would result in direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats. The principal impacts to these species likely to be associated with the Proposed Action include: (1) flow depletion due to project-related water use; (2) increased sedimentation of the Green River; and (3) an increased risk of accidental spills of pollutants such as natural-gas condensate and oil into the Green River or its tributaries. The magnitude of these impacts to Colorado River endangered fish species would depend on a number of factors including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

Water depletion also may affect aquatic habitats and fisheries resources within these watersheds. Water requirements for drilling, hydrostatic testing, dust abatement, and other project activities would be acquired from permitted sources. These sources may include direct withdrawals from the Green River, Pariette Draw, municipal sources, and local supply wells. Existing authorized water usage would directly and indirectly consume water from the Green River and ultimately cause reductions in flow within the Colorado River Basin.

The Colorado River fish are affected by activities that deplete or degrade the flow of downstream waters into the Upper Colorado River Basin (USFWS 1987). In addition to reducing the quantity of water with sufficient quality in a specific location, water depletions can also reduce a river's ability to create and maintain the physical habitat (areas inhabited by, or potentially inhabitable by, special status fish for use in spawning, nursery, feeding, and rearing, or access to these habitats) and the biological environment (food supply, predation, and competition). Water depletions can also contribute to alterations in flow regimes that favor non-native fish that compete with native fish species for resources.

As discussed in **Section 4.6.1.1.1.1.**, it is estimated that total water use in drilling and completion of 5,750 wells under the Proposed Action would be approximately 1,150 acre-feet of water annually. Additionally, it is estimated that Newfield would use approximately 78 acre-feet of water per year for dust abatement during project operations and up to 2,738 acre-feet per year for water-flooding operations. Thus, total water use under the Proposed Action would average approximately 3,966 acre-feet annually over the 20- to 30-year construction and operational period.

On January 22, 1988, a Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (Recovery Program) was initiated to address depletion (and other) impacts to the Colorado River fish. Any water depletions from tributary waters within the Colorado River drainage are considered to "*jeopardize the continued existence*" of these fish under this Recovery Program. A Section 7 agreement was implemented on October 15, 1993, by Recovery Program participants to further define and clarify objectives of the recovery process as stated in the Recovery Program. Incorporated into this agreement was the Recovery Implementation Program Recovery Action Plan (RIPRAP). The RIPRAP identified actions currently believed to be required to recover the Colorado River fish most expeditiously. Included in the RIPRAP was the requirement that a one-time depletion fee would be paid to help support the Recovery Program for all non-historical water depletions from the Upper Colorado River Basin. These depletion fees were intended to be a Reasonable and Prudent Alternative to avoid jeopardy to the endangered Colorado River fish by depletions to the Upper Colorado River Basin. In 1995, USFWS eliminated these water depletion fees for water depletions from the Upper Colorado River Basin of 100 acre-feet per year or less (USFWS 1995b).

Newfield currently has secured water rights for up to 5,106 acre-feet per year. Of this volume, 324 acre-feet are from water sources considered historic depletions under the Recovery Implementation Program for Endangered Fish Species in the Upper Colorado River Basin (USFWS 1987). Section 7 consultation was completed for all historic depletions in 1993 (USFWS 1993). As part of this consultation, it was determined that historic depletions, regardless of size, do not pay a depletion fee to the Recovery Program. Newfield's additional water sources (WR 41-3530; WR 47-1802; WR 47-1804) are not considered historic depletions and Section 7 Consultation with the USFWS is required prior to use of these sources. To date, three consultations have been completed for water depletions associated with oil and gas development projects in the MBPA. Currently, a total annual volume of 3,328 acre-feet has been authorized through these USWFS consultations (refer to **Table 2.2.8.4-1**). Water supply sources used under these previous consultations, plus the historic water rights equals a total of 3,652 acre-feet of water available for this Project. The additional 314 acre-feet of water needed under the Proposed Action would require additional consultation.

Potential impacts to Colorado River fish from construction and operation of the proposed water collection station would include short-term disturbance of about 1 acre of floodplain habitat, which could result in erosion and sediment yield. Impingement at the intakes is not anticipated as a result of the use of screening. Hydrocarbons located at the nearby (but outside of the floodplain) water processing station would be limited produced natural gas or NGL that would be used as a fuel source to power the 300-600 hp generator associated with the processing station. Therefore, there is a low risk of leaks or spills from hydrocarbons associated with the water collection station to impact fish.

Implementation of the Proposed Action could also degrade USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Sediment deposition may bury and suffocate fish eggs and larvae affecting spawning and rearing, while reduced visibility created by sediment load may inhibit the ability of fish to see prey, impacting feeding behavior (USEPA 2003). Physiological impacts such as gill clogging and the ingestion of large quantities of sediment could also cause illness, reduced growth, and eventual death (USEPA 2003). Due to existing surface disturbance, ongoing projects, and poor reclamation success of previously disturbed areas within the MBPA and surrounding region, increased erosion and subsequent sediment yield are likely to occur within these watersheds.

Sediment would be delivered to several perennial streams, riparian habitats, and small, ephemeral drainages (i.e., Castle Peak Draw, Wells Draw, Big Wash, Sheep Wash) within the MBPA. Conservatively, assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River, the Proposed Action would increase sediment loading to the Green River by about 62 tons annually or by 0.001 percent in the short-term.

Activities within or adjacent to the 100-year floodplains of Pariette Draw and Green River or within drainages leading to these watercourses may increase the potential for a release of contaminants into these areas. Leaks or spills of contaminants may lead to habitat degradation and mortality of fish. The risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill would depend on the location of the spill relative to the main stem Green River. Natural gas condensate contains a variety of lightweight hydrocarbons, of which the most toxic to aquatic biota is the aromatic hydrocarbon fraction (benzene, ethylbenzene, toluene, xylenes). These account for less than 0.5 percent of the volume of condensate (BLM 2005b). Natural-gas condensate is highly volatile and likely to evaporate within approximately 8 hours of spilling (BLM 2005b). Thus, spills occurring in close proximity to the Green River, or in streams with flow rates that would deliver condensate to the Green

River prior to evaporation, would pose a risk of exposing Colorado River fish to potentially lethal levels of toxic substances.

Under the Proposed Action, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA. Because the crude oil extracted within the MBPA is solid within the temperature range of the area's climate, oil would not pose a risk of acute toxicity for Colorado River endangered fish in the event of an accidental spill. A catastrophic spill of a 400-barrel (16,800 gallon) condensate tank within the 100-year floodplain of the Green River (while highly unlikely) would have a high probability of producing acutely toxic concentrations of condensate in the Green River, and therefore, is considered a possible adverse impact to Colorado River fish. A spill from a condensate tank within the Green River floodplain would constitute the overall worst case scenario under the Proposed Action, and would likely result in acute toxicity at some flow levels and an adverse impact to designated critical habitat.

ACPEMs and BMPs for the site-specific use of buried pipelines and centralized water and condensate tank facilities (where they were determined to be appropriate at the site-specific level) would reduce the risk of spills from pipelines and tanks. Burying pipelines would reduce the risk of accidental puncture of pipelines, and central tanks batteries could be located outside the floodplain, greatly reducing the risk of spills affecting the Green River. The risk of a spill from pipelines is considered to be low because proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of the Proposed Action ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or "take" of an unknown number of individual fish would be anticipated. The potential also exists that portions of the designated critical habitat for these species may be adversely modified.

***Uinta Basin Hookless Cactus and Pariette Cactus***

Implementation of the Proposed Action would directly result in the disturbance of approximately 7,762 acres of potential habitat for *Sclerocactus* species within the MBPA, which represents approximately 1.7 percent of the total potential habitat for *Sclerocactus* species across their entire range. Following construction, approximately 4,370 acres (56 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to *Sclerocactus* species' habitat under the Proposed Action would be reduced to approximately 3,392 acres.

Under the Proposed Action, approximately 69 proposed wells would be drilled within Level 1 Core Conservation Areas and approximately 92 proposed wells would be drilled within Level 2 Core Conservation Areas for *Sclerocactus* species. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 946 acres of Level 1 core habitat and 1,853 acres of Level 2 core habitat within the MBPA. Following construction, approximately 62 percent of the disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Level 1 and 2 Core Conservation Areas under the Proposed Action would be reduced to approximately 250 and 776 acres, respectively.

Implementation of the Proposed Action also would increase the potential for occurrence of indirect and dispersed direct effects to *Sclerocactus* species, if present. Disturbances from construction could increase

the potential for the invasion and establishment of noxious weed species. Invasion by non-native species is particularly problematic as they are capable of effective competition with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native species can choke out native vegetation and eventually dominate large areas. An increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are more flammable and establish in denser populations than woody and non-woody native vegetation.

Additional indirect construction-related impacts could include an increased potential for wind erosion of disturbed areas creating airborne dust that could be transported into suitable habitat for these species. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in these species. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Thompson et al. (1984) and Farmer (1992) have indicated that varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis.

Other indirect impacts to *Sclerocactus* species could include impacts from the use of herbicides to control invasive plants in the MBPA and possible reductions in pollination or seed dispersal from a larger road network that could result in isolation of populations due to habitat fragmentation and increased dust. Because *Sclerocactus* species require insect pollinators for successful reproduction (Tepedino et al. 2010), impacts to pollinator nesting and foraging habitats can negatively affect the cactus by reducing the diversity and abundance of pollinators and, thereby, the plant's ability to successfully reproduce. Expansion of access roads also could also increase the risk of illegal collecting of *Sclerocactus* species.

The species-specific conservation measures for *Sclerocactus* species (**Section 4.10.2**) include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants and monitor the effectiveness of these measures. The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures would minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion cannot be entirely negated. These disturbances could continue to negatively impact *Sclerocactus* species throughout the MBPA. An undetermined number of individual plants could be lost. Therefore, implementation of the Proposed Action ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

***Ute Ladies'-tresses***

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Under the Proposed Action, no disturbance is proposed within riparian areas in the Pariette ACEC, and 18 wells (35.2 acres of disturbance) are proposed in wetland vegetative cover types in the Pariette ACEC. While the presence of wetlands is an important habitat quality for this species, the wetland vegetative cover includes open water and greasewood flats that do not represent suitable habitat for Ute ladies'-tresses. Direct disturbance to potential habitat for this species is unlikely because very little disturbance to wetlands or riparian floodplains are expected to occur under implementation of the Proposed Action and because of the conservation measures included in **Section 4.10.2**.

Implementation of the Proposed Action also would increase the potential for occurrence of indirect and dispersed direct effects to Ute ladies'-tresses, if present. Disturbances from construction could increase the potential for the invasion and establishment of noxious weed species. Invasion by non-native species is particularly problematic as they are capable of effective competition with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native species can choke out native vegetation and eventually dominate large areas. An increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are more flammable and establish in denser populations than woody and non-woody native vegetation.

Additional indirect construction-related impacts could include an increased potential for wind erosion of disturbed areas creating airborne dust that could be transported into suitable habitat for these species. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in these species. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Thompson et al. (1984) and Farmer (1992) have indicated that varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis.

The species-specific conservation measures for Ute ladies'-tresses include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants and monitor the effectiveness of these measures. The proposed mitigation measures for Ute ladies'-tresses are described in **Section 4.10.2.5**.

No loss of individual plants is anticipated through implementation of the Proposed Action; however, the Proposed Action has the potential to disturb suitable habitat for this species. Therefore, the Proposed Action ***may affect, is not likely to adversely affect*** the Ute ladies'-tresses.

#### 4.10.1.1.2 BLM Sensitive Species and Utah State Species of Concern

***Fringed Myotis, Spotted Bat, Big Free-tailed Bat, and Townsend's Big-eared Bat***

Approximately 7,996 acres (6 percent) of pinyon-juniper woodland, desert shrub and riparian woodland habitats used for foraging by the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat would be disturbed as a result of the Proposed Action. Considering these species are uncommon in northeastern Utah (Oliver 2000) and there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to be a significant impact to for the fringed myotis, spotted bat, big free-tailed and Townsend's big-eared bat. Additionally, interim reclamation would restore 3,539 acres of foraging habitat which would reduce the disturbance to 4,457 acres for the remaining LOP.

Under the Proposed Action, approximately 491 acres (0.4 percent) of surface disturbance would occur in potential roosting habitat for the fringed myotis, spotted bat, big free-tailed and Townsend's big-eared bat. This habitat is classified as Colorado Plateau Mixed Bedrock Canyon and Tableland. While cliff and crevice habitats are not typically directly disturbed by construction, development in the vicinity of these habitats is possible.

Indirect impacts to these species are likely to include noise from construction activities, vehicle traffic, and increased human presence. Many bat species are easily disturbed by noise and human presence (Oliver 2000). These species are especially sensitive to disturbance during roosting, maternity, and

parturition. Abandonment of roost sites may occur due to increased human presence and noise disturbance (Oliver 2000).

Artificial light used for drilling operations conducted during the evening have the potential to increase disruption of foraging behavior and increase the risk of bats predation. Additionally, bats could be attracted to reserve pits by mistaking them for bodies of water. Reserve pits have the potential to contain wastewater with salts and brines, organic chemicals, petroleum hydrocarbons, surfactants, of substances that may pose a risk to bats and other wildlife. These materials can be hazardous to bats through ingestion or loss of insulation due to residue on fur. Although these pits are small and temporary, the simultaneous presence of large numbers of open pits on the landscape presents a potentially significant cumulative hazard to many bat species and other wildlife. Covering or netting pits or tanks would be one of the most effective measures to offset this impact (see **Section 4.9.2**). By adhering to the stated ACEPMs and successful reclamation, both interim and final, the Proposed Action is ***not likely to result in a trend towards federal listing of the species***.

***White-tailed Prairie Dog***

Implementation of the Proposed Action would result in the direct disturbance to approximately 1,317 acres (or approximately 14 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.5**, approximately 9,701 acres of prairie dog colonies are mapped within the MBPA. Potential direct adverse impacts to this species associated with oil and gas development include the following: habitat loss due to clearing and crushing of vegetation; fragmentation of available habitat due to pad construction, road development, and well operation; temporary displacement of animals; increased potential for vehicle collisions with prairie dogs; alteration of surface water drainages; and degraded habitat values due to increased soil compaction. Indirect effects to white-tailed prairie dogs include increased shooting pressure caused by improved access into remote areas (Seglund et al. 2004).

Construction activities have the potential to introduce and spread noxious weeds and invasive species. Invasive species may reduce the overall quality of forage for prairie dogs and ultimately may limit prairie dog populations. Specific measures under the Proposed Action, including the ACEPMs for general wildlife and vegetation, would reduce impacts to the white-tailed prairie dog. Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. However, impacts to white-tailed prairie dogs are likely to occur due to difficulties with reclamation in the Uinta Basin and a potential increase of weedy species. Weed control would reduce habitat degradation and ACEPMs to reduce speeding on area roads would lessen the potential for collisions between prairie dogs and vehicles.

In addition, management protections for white-tailed prairie dog colonies contained in the approved Vernal RMP (BLM 2008a) management decisions include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. No long-term population level impacts would be expected from development of the Proposed Action because of prairie dog adaptation to disturbed sites, large amount of remaining habitat, and their tolerance to human activity. Overall, the Proposed Action may directly and indirectly impact individual white-tailed prairie dogs, but ***is not likely to result in a trend towards federal listing of the species***.

***Greater Sage-grouse***

Oil and gas development can cause sage-grouse populations to decline; however, the specific reasons for declines are still unknown (Braun et al. 2002; Connelly et al. 2000). The primary impacts of development to sage-grouse include direct habitat loss from well pad, road, pipeline and facility construction, as well as avoidance and displacement due to increased human activity and habitat fragmentation. Braun et al. (2002) maintain that oil and gas development may have negative short-term (site construction, drilling, and completion), and long-term (road development) effects.

Numerous citations have linked oil and gas development to declines in sage-grouse populations. For example, Holloran (2005), Doherty et al. (2008), Walker et al. (2007), Lyon and Anderson (2003), and Crompton and Mitchell (2005) have linked population reductions in response to oil and gas development. Sage-grouse exhibit fidelity to traditional winter use areas and surface disturbance and human activity in these areas may cause sage-grouse to displace to less adjacent habitats, which may not have the desired vegetative cover and/or may leave the species more susceptible to predation.

Additionally, various studies have determined that sage-grouse are affected by human activity (Braun 1986; Lyon and Anderson 2003; Remington and Braun 1991). These studies have determined that hens nested farther away from leks in areas where human disturbance occurred, and that nesting initiation rates were also lower. In addition, it was also determined that male attendance at leks was lower when human activity occurred within 2 miles. The UDWR identified one lek, known as the Myton Bench – Wells Draw lek, near the southwestern portion of the MBPA, approximately 0.5 miles from the nearest proposed development. This lek was last reported as active during the 1999 season, and has since been eliminated and replaced by project facilities; therefore, there would be no impacts to leks within the MBPA from implementation of the Proposed Action.

The UDWR has not yet identified priority habitat using a consistent methodology. Although most of the habitat within the MBPA is marginal for sage-grouse breeding and nesting, it is possible that a few individual sage-grouse occasionally use portions of the MBPA. Approximately 2,979 acres of sagebrush shrubland (which may provide marginal habitat for sage-grouse) would be disturbed from activities related to the Proposed Action. Project-related noise (e.g., increased volumes or types of noise from construction, drilling, and production equipment, changes in ambient tones or tonal noises, and repetitive low frequency noise emanating from production equipment such as compressor stations) may affect sage-grouse that occasionally occupy the MBPA. Sage-grouse could be temporarily displaced by noise and other human activities until activities are completed.

Based on the information above, implementation of the Proposed Action may impact individual sage-grouse, but ***is not likely to result in a trend towards federal listing of the species.***

***Bald Eagle***

As discussed in **Section 3.10.2.1.7**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of the Proposed Action. However, potential impacts from the Proposed Action that may affect wintering bald eagles that roost in along the Green River corridor and forage within the MBPA include:

- Direct habitat loss in foraging areas and/or habitat degradation to roosting areas due to construction activities

- Temporary habitat loss due to changes in vegetation structure
- Temporary displacement caused by increased human activity, traffic, and noise levels/types
- Increased potential for collisions with vehicles when foraging on carrion

Implementation of the Proposed Action would result in the direct, initial short-term loss of approximately 11,163 acres suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities. Loss of prey habitat could decrease prey abundance, which has been shown to cause eagles to shift their geographic foraging patterns. These shifts in foraging patterns may force eagles to travel farther and expend additional energy that causes greater physical stress (Brown 1993). Additionally, any degradation of stream habitat and associated fisheries would lower the availability of aquatic prey for foraging eagles. Other effects on bald eagles could include direct habitat loss and temporary habitat loss associated with surface disturbance and changes/losses in vegetation structure from project development.

Wintering bald eagles congregate at established sites for purposes of feeding and sheltering in close proximity to sufficient food sources. Approximately 60 acres of surface disturbance is proposed within 0.5 mile of identified bald eagle roosting locations. Human activities near or within communal roost sites may prevent eagles from feeding or taking shelter, especially if other undisturbed suitable sites are not available. Disruptive activities in the flight path between important roosting and foraging areas may interfere with feeding, and activities that permanently alter these habitats may eliminate essential elements for feeding and sheltering eagles within an area (USFWS 2007d). Some studies have shown that sensitivity of bald eagles to human activity may lead to nest or roost abandonment during periods of drilling or construction (Steidl and Anthony 1996; Steidl and Anthony 2000); however, other studies have shown evidence of bald eagle habituation to human-induced disturbances (Parson 1994; Steidl and Anthony 1996).

With implementation of the Proposed Action, drilling and construction activities would continue through the winter months, thus increasing human presence, traffic, and associated noise levels (e.g., increased volumes from construction, drilling, and production equipment, changes in ambient tones or tonal noises, and repetitive low frequency noise emanating from production equipment such as compressor stations). Wintering eagles are likely to search for prey in the MBPA from early November through late March. Because bald eagles will feed on roadside carrion (particularly during these months), the risk of being struck by a vehicle would increase under the Proposed Action due to a commensurate increase in traffic levels associated with an estimated 606-miles of new roads under this alternative. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles. Additionally, development activities could result in short-term displacement and increased stress levels in roosting and foraging bald eagles during the winter months when roosting typically occurs. The proposed water collector well would be drilled during low-flow, in the fall or winter. Construction activity within the floodplain during the winter months could lead to temporary displacement from roosting and foraging habitat. However, these potential impacts would likely be minimal because little development has been proposed near bald eagle roosting and foraging habitats identified along Pariette Draw and the Green River corridor.

Overall, the Proposed Action may directly and indirectly impact individual bald eagles, but ***is not likely to result in a trend towards federal listing of the species***.

### *Golden Eagle*

Impacts to golden eagles from implementation of the Proposed Action would be similar to those identified and assessed in **Section 4.9.1.1.6** for raptors including displacement caused by increased human activity, nest desertions and/or reproductive failure caused by project-related disturbances, increased public access and subsequent human disturbance resulting from new road construction, and temporary reductions in prey populations due to habitat fragmentation and alteration. The Proposed Action would result in direct adverse long-term impacts to breeding, nesting, and wintering golden eagles. The level of these impacts would depend on the location of the proposed development activities relative to occupied territories, active or inactive nest sites, wintering areas, and foraging areas. Vegetation loss associated with the Proposed Action would result in the loss of approximately 11,163 acres of habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). The loss of some prey species may limit foraging opportunities for individual eagles. Impacts to small mammal populations due to habitat loss and fragmentation can result in a reduced prey base for raptors, resulting in lower raptor densities. In addition, golden eagles may avoid hunting grounds where construction or drilling activities are taking place. Like the bald eagle, roadside carrion is one of the golden eagle's primary winter food sources, the potential for vehicle collisions with carrion-feeding golden eagles could increase in the MBPA as a result of increased traffic levels.

Approximately 2,402 acres of surface disturbance is proposed within 0.5 mile of identified golden eagle nests. Project development and construction in proximity to an active nest during the breeding season may result in nest abandonment (a direct adverse effect) and mortality of young (an indirect, adverse effect). Such disturbance could result in temporary displacement of eagles or avoidance of nesting sites caused by increased human activity, traffic, and traffic levels. Since golden eagles often alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs could prevent inactive nests from being used in the future. It is likely that previous development and ongoing operations could result in a reduction in habitat suitability and may preclude future use by this species within the MBPA.

As outlined in **Section 3.10.2.1.8**, golden eagles are a widespread raptor species in the MBPA with some 72 known golden eagle nests, 17 of which were active between 2006 and 2008. BLM-required seasonal and spatial restrictions and the ACEPM detailed in **Section 2.2.12.7** would minimize direct impacts to suitable habitat and eliminate direct impacts to individual birds during the nesting season. Under these measures, no construction or surface-disturbing activities would occur within 0.5 mile of an active nest during the breeding season. With implementation of this ACEPM and other conservation measures, including interim and final reclamation, adherence to speed limits, and measures to contact the County for carrion removal, the Proposed Action may affect individual golden eagles but ***is not likely to result in a trend towards federal listing of the species.***

### *Ferruginous Hawk*

Implementation of the Proposed Action could result in both direct and indirect impacts to the ferruginous hawk. Impacts to ferruginous hawks from implementation of the Proposed Action would be very similar to those identified and assessed in **Section 4.9.1.1.6** for raptors including temporary displacement caused by increased human activity, nest desertions and/or reproductive failure caused by project-related disturbances, increased public access and subsequent human disturbance resulting from new road construction, temporary reductions in prey populations due to habitat fragmentation and alteration.

Ferruginous hawks are particularly susceptible to human-caused disturbances during courtship and incubation periods, and the species will abandon nests if disturbed prior to the eggs hatching (Wheeler 2003). Approximately 2,075 acres of surface disturbance is proposed within 0.5 mile of identified ferruginous hawk nests within the MBPA. Construction, drilling, or completion activities plus increased traffic could potentially disrupt breeding and nesting activities in the MBPA. Such disturbance could result in displacement from nesting sites and reduce nesting success. A reduction in reproductive success could continue throughout the LOP, particularly where historical nesting sites are located near heavy traffic roads or areas with intense human activity. Displacement could lead to increased use of adjacent habitats, which could consequently lead to increased inter- and intra-specific competition for resources.

Surface disturbances associated with the Proposed Action would result in the initial, direct loss of and fragmentation of approximately 11,163 of acres habitat for prey species such as ground squirrels, prairie dogs, jackrabbits, rabbits, small rodents, and birds. The direct habitat loss and reduced habitat values in foraging areas, loss of prey and prey habitat, plus an increased potential for collisions with vehicles traveling in the MBPA, may limit foraging opportunities for individual ferruginous hawks.

As outlined in **Section 3.10.2.1.9**, ferruginous hawks are a widespread raptor species in the MBPA with 72 known nests, 18 of which were active between 2006 and 2008. BLM-required seasonal and spatial restrictions and the ACEPM detailed in **Section 2.2.12.7** would minimize direct impacts to suitable habitat and eliminate direct impacts to individual birds during the nesting season. Under these measures, no construction or surface-disturbing activities would occur within 0.5 mile of an active nest during the breeding season, which occurs from March 1 through August 1. This measure also reduces the risk of direct mortality and nest abandonment during the breeding season. With the implementation of this ACEPM and other conservation measures, including interim and final reclamation, as well as adherence to speed limits, the Proposed Action may affect individual ferruginous hawks but ***is not likely to result in a trend towards federal listing of the species.***

***Short-eared Owl***

Implementation of the Proposed Action could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only one short-eared owl nest has been documented within the MBPA because limited nesting habitat is present within the area. Approximately 15 acres of surface disturbance is proposed within 0.25 mile of this nesting site. Implementation of the Proposed Action would likely have minimal impacts on short-eared owls. Temporary displacement or avoidance of habitats could affect short-eared owls potentially nesting on the ground in the vicinity of construction activities. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Short-eared owl nests are often located on the ground and are difficult to see in areas of dense vegetation. Active nests could potentially be missed during aerial or ground surveys which could result in impacts on breeding, nesting, and fledgling success and may also be subject to mortality from collisions with construction vehicles or equipment. It is likely that previous development and ongoing operations have resulted in a reduction in habitat suitability and may preclude future use by this species within the MBPA. Implementation of the Proposed Action may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

***Burrowing Owl***

The UDWR has identified and mapped approximately 9,701 acres of white-tailed prairie dog colonies within the MBPA, which serves as suitable habitat for the burrowing owl. Approximately 1,317 acres of this habitat would be disturbed under the Proposed Action. Implementation of the Proposed Action would have both direct and indirect adverse impacts on burrowing owls in the MBPA. The adverse impacts would include a direct loss of nesting and foraging habitat; loss of prey and prey habitat; an increased risk of vehicle-related mortality; increased displacement due to increased noise and human presence; and increased habitat fragmentation and habitat modification. Approximately 166 acres of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA. Surface-disturbing activities or areas with concentrated human activity in proximity of an active burrowing owl nest could lead to nest abandonment, thereby affecting the breeding pair and their annual productivity. Since burrowing owls alternate between nest sites within a breeding territory, any surface facilities where ongoing traffic or human presence occurs in or near active prairie dog colonies could prevent burrows from being used as nest sites in the future. Avoidance of disturbed areas could lead to an increased use of adjacent habitat, which could then lead to increase inter- and intra-specific competition for resources with these adjacent habitats.

With implementation of the Proposed Action, the greatest indirect impacts would likely be related to reduced forage and nesting habitat. In order to protect burrowing owls during exploration, drilling, and other development activities, ACEPMs will be implemented to reduce or minimize displacement or nest abandonment including spatial/temporal buffers around active nests and adherence to speed limits. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Indirect, negative impacts could include displacement from foraging areas and reduction of prey species. Based on these potential indirect effects, the Proposed Action may affect individual burrowing owls but ***is not likely to result in a trend towards federal listing of the species.***

***Lewis's Woodpecker***

This species may be present along portions of Pariette Wash which occur within the MBPA. Approximately 664 acres (or 0.5 percent) of woodland habitat within the MBPA could be directly affected by the Proposed Action. Impacts to the Lewis woodpecker include the direct loss of any large mature trees in riparian areas that could serve as suitable reproduction and foraging areas, timing of surface disturbing actions, and increased human presence during sensitive breeding and nesting periods. These impacts could cause individual breeding pairs to abandon the area and/or abandon the nest and young by choosing other areas.

Indirect impacts extend these direct impacts to include increased inter- and intra-species competition for suitable breeding and foraging sites elsewhere along the riparian corridors. Of the 16,129 acres of surface disturbance, approximately 8,321 acres would be reclaimed, and the remaining 7,808 acres would be lost for the LOP. It is reasonable to expect that considerably more time following interim and final reclamation would be needed, possibly as long as 20 years, for any downed mature riparian trees species (primarily cottonwood) to be replaced and achieve a vertical height and canopy cover preferred by the Lewis's woodpecker. Displacement to other, possibly less suitable habitat areas could result in lowered

overall physical conditioning of the birds, affecting breeding success and survivability of young. It is likely that Lewis's woodpeckers would avoid the disturbed riparian areas until the required canopy composition and structure are returned. Because suitable reproduction and foraging habitat for the Lewis's woodpecker occurs along the Pariette Wash, along the Green River, and at the nearby Ouray Wildlife Refuge, the Proposed Action ***is not likely to result in a trend towards federal listing of the species.***

***American White Pelican***

The Proposed Action, no direct loss of breeding or foraging habitat is anticipated as a result of construction and operation activities. No wetlands and riverine habitats that would host shallow fish populations would be disturbed by the Proposed Action. Additionally, no island habitats near freshwater lakes are present within the MBPA.

American white pelicans using the Green River adjacent to the MBPA may be indirectly impacted from the development activities within the MBPA. Increased noise and light on well construction sites could potentially lead to the abandonment of adjacent foraging areas in the Green River east of the MBPA. The increase in erosion and subsequent sedimentation as a result of Proposed Action could lower the quality of habitat for prey species within the Green River, which would reduce the amount of available prey in foraging habitat within the Green River. Because breeding habitat is not present in the MBPA and due to the low quantity of foraging habitat within and adjacent to the MBPA, the Proposed Action ***is not likely to result in a trend towards federal listing of the species.***

***Long-billed Curlew***

The conversion of grassland habitat to oil and gas facilities represents a direct loss of breeding habitat for the long-billed curlew. Under the Proposed Action, approximately 1,106 acres (0.9 percent) of grassland habitat that could be utilized for nesting and foraging would be disturbed by construction activity. Should well construction, drilling, and completion occur during spring and summer months, breeding birds migrating and nesting in grassland habitat within the MBPA may be subject to indirect effects such as noise and visual disturbances or direct effects such as loss of breeding habitat from construction activities.

Indirect disturbance such as environmental stress upon breeding pairs of long-billed curlew may lead to nest abandonment, lowered reproductive success, and reduced physical condition. The movement of individuals into adjacent habitats could increase intra- and inter- specific competition due to increases in animal density within these habitats. Displacement to other, possibly less suitable habitat areas could result in lowered overall physical conditioning of the birds, affecting breeding success and survivability of young. Because the Proposed Action will not impact the Ouray National Wildlife Refuge, which is the only area near the MBPA that nesting long-billed curlews have been observed, and because grasslands that may serve as suitable habitat for long-billed curlew are found throughout the Uinta Basin, the Proposed Action ***is not likely to result in a trend towards federal listing of the species.***

***Mountain Plover***

As outlined in **Section 3.10.2.1.15**, approximately 75,701 acres of historic mountain plover habitat and 455 acres of concentration areas are located within the MBPA. Direct impacts to mountain plover would result from the direct loss of grassland-low shrub habitat suitable for reproduction and foraging, as well as the timing of surface disturbing actions and increased human presence during sensitive breeding and

nesting periods. These impacts could cause individual breeding pairs to abandon the area and/or abandon the nest and young by choosing other areas.

Indirect impacts extend the direct impacts to include increased inter- and intra-species competition for suitable breeding and foraging sites elsewhere within the salt desert shrub and sagebrush areas both in the MBPA and surrounding areas. The Proposed Action would result in disturbance to approximately 10,446 acres (or about 14 percent of potential habitat within the MBPA) of potential mountain plover habitat. Approximately 71 acres (about 1.6 percent of concentration areas within the MBPA) of concentration areas for mountain plover would be impacted under the Proposed Action. Suitable reproduction and foraging habitat for the mountain plover mainly occur within these concentration areas. As such, implementation of the Proposed Action may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

***Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker***

River depletions, sedimentation, crude oil and natural gas condensate spill effects, and modification of larval fish habitat are effects in common to the special concern Colorado River system fish species (i.e., roundtail chub, bluehead sucker, and flannelmouth sucker). These three species could be negatively affected by the Proposed Action's impacts to the Green River, and impacts to these species would be the same as the impacts to federally listed Colorado River fish, as described above. Implementation of the Proposed Action may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

***Barneby's Catseye***

Implementation of the Proposed Action could result in the direct disturbance of potential habitat for Barneby's catseye, if present within the MBPA. Under the Proposed Action, approximately 1,292 acres of pinyon-juniper woodland and sagebrush vegetation, which serves as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 760 acres of initial disturbance (59 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under the Proposed Action would be reduced to approximately 532 acres.

As with the Uinta Basin hookless cactus, implementation of the Proposed Action could also increase the potential for indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. In addition, these disturbances could potentially increase wind erosion of disturbed areas, which creates airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Graham's Catseye***

Implementation of the Proposed Action could result in the direct disturbance of potential habitat for Graham's catseye, if present within the MBPA. Under the Proposed Action, approximately 7,399 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 4,244 acres of initial disturbance (57 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is

successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under the Proposed Action would be reduced to approximately 3,155 acres.

As with the Uinta Basin hookless cactus and Barneby's catseye, implementation of the Proposed Action could also increase the potential for indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. Moreover, these disturbances could potentially increase wind erosion of disturbed areas creating airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Green River Greenthread***

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited, and direct disturbance to potential habitat for this species is unlikely. However, implementation of the Proposed Action could increase the potential for occurrence of indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. These disturbances could potentially increase wind erosion of disturbed areas creating airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

***Sterile Yucca***

Implementation of the Proposed Action could result in the direct disturbance of potential habitat for sterile yucca, if present within the MBPA. Under the Proposed Action, approximately 1,518 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for sterile yucca, would be impacted. Following construction, approximately 866 acres of initial disturbance (57 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under the Proposed Action would be reduced to approximately 652 acres.

As with the Uinta Basin hookless cactus, Barneby's catseye, and Graham's catseye, implementation of the Proposed Action could also increase the potential for indirect and dispersed direct effects to this species, if present. Disturbances from construction could increase the potential for the limited invasion and establishment of noxious weed species. Furthermore, these disturbances could potentially increase wind erosion of disturbed areas, which creates airborne dust that could be transported into suitable habitat for this species, as described previously for the Uinta Basin hookless cactus. Implementation of the Proposed Action may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

### 4.10.1.2 Alternative B – No Action Alternative

#### 4.10.1.2.1 Species Listed as Federally Threatened, Endangered, or Proposed

***Western Yellow-billed Cuckoo***

Direct and indirect impacts to the WYBC under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Under the No Action Alternative, Newfield would continue to construct roads, well pads, and ancillary facilities to complete up to 788 wells, including those proposed on state and private lands or minerals, as well as those previously approved under the August 2005 ROD for the Castle Peak and Eightmile Flat Oil and Gas Expansion EIS.

The overall surface disturbance to Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation that serves as potential nesting and foraging habitat for cuckoo would be approximately 1 acre, which is nearly 95 percent less than the Proposed Action.

Because implementation of Alternative B would directly impact only 1 acre of suitable WYBC habitat, it would constitute a negligible percentage of suitable habitats available throughout the range of this species. Thus, implementation of the No Action Alternative ***is not likely to result in a trend towards federal listing of the species.***

***Colorado River Fish Species***

Direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of far less magnitude. The severity of these impacts to Colorado River endangered fish species would depend on a number of factors including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

As outlined in **Section 4.6.1.2.1.1**, it is estimated that total water use in drilling and completion of 788 wells under the No Action would be approximately 322 acre-feet of water annually. Additionally, it is estimated that Newfield would use approximately 10 acre-feet of water per year for dust abatement during project operations and up to 548 acre-feet per year for water-flooding operations. Thus, total water use under the No Action Alternative would average approximately 884 acre-feet annually over the 20- to 30-year construction and operational period, which is approximately 3,082 acre-feet per year less than what would be used under the Proposed Action.

As with the Proposed Action, implementation of Alternative B could also degrade USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Conservatively, assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River, Alternative B would increase sediment loading to the Green River by about 49 tons annually or by approximately 0.001 percent in the short-term. This represents approximately a 13 ton decrease than that under the Proposed Action.

Under Alternative B, pipelines would cross ephemeral streams at approximately 783 locations within the MBPA. For the same reasons as described under the Proposed Action, the potential for a release of contaminants into the main stem of the Green River and subsequent increased risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill is considered

to be low. The proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of Alternative B ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or "take" of an unknown number of individual fish would be anticipated. The potential also exists that portions of the designated critical habitat for these species may be adversely modified.

***Uinta Basin Hookless Cactus and Pariette Cactus***

Implementation of the No Action Alternative would directly result in the disturbance of approximately 172 acres of potential habitat for *Sclerocactus* species within the MBPA, which represents approximately 0.1 percent of the total potential habitat for *Sclerocactus* species across their entire range. Following construction, approximately 32 acres (19 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to *Sclerocactus* species' habitat under the No Action Alternative would be reduced to approximately 140 acres.

Under the No Action Alternative, approximately one proposed well would be drilled within Level 1 Core Conservation Areas and approximately eight proposed wells would be drilled within Level 2 Core Conservation Areas for *Sclerocactus* species. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 5.5 acres of Level 1 core habitat and 69 acres of Level 2 core habitat within the MBPA. Following construction, approximately 21 percent of the disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Level 1 and 2 Core Conservation Areas under the No Action Alternative would be reduced to approximately 4.3 and 55 acres, respectively.

Indirect and dispersed direct effects to *Sclerocactus* species (including an increased potential for the invasion and establishment of noxious weed species, impacts from herbicides used to control invasive plants in the MBPA, and possible reductions in pollination or seed dispersal from a larger road network that could result in isolated populations due to habitat fragmentation and increased dust) would be similar to that previously discussed under the Proposed Action. However, the magnitude of indirect impacts would be considerably less because 7,413 fewer acres of potential habitat for *Sclerocactus* species would be impacted under the No Action Alternative as compared to those under the Proposed Action.

The species-specific conservation measures for *Sclerocactus* species (**Section 4.10.2**) would include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants, and monitor the effectiveness of these measures. The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures will minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion cannot be entirely negated. These disturbances will continue to negatively impact *Sclerocactus* species throughout the MBPA. An undetermined number of individual plants will be lost. Therefore, implementation of the No Action Alternative ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

***Ute Ladies'-tresses***

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Direct disturbance to potential habitat for this species is unlikely because no disturbance to wetlands or riparian areas in the Pariette ACEC is expected to occur under implementation of the No Action Alternative. For the same reasons, the potential for occurrence of indirect and dispersed direct effects to this species from the No Action Alternative would be unlikely to occur.

The species-specific conservation measures for Ute ladies'-tresses include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants and monitor the effectiveness of these measures. The proposed mitigation measures for Ute ladies'-tresses are described in **Section 4.10.2.5**.

No loss of individual plants is anticipated through implementation of the No Action Alternative and the No Action Alternative is not anticipated to disturb suitable habitat for this species. Therefore, the No Action Alternative ***is not likely to adversely affect*** the Ute ladies'-tresses.

#### 4.10.1.2.2 BLM Sensitive Species and Utah State Species of Concern

***Fringed Myotis, Spotted Bat, Big Free-tailed Bat, and Townsend's Big-eared Bat***

Direct and indirect impacts to the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Under the No Action Alternative, approximately 18 acres (2 percent) of surface disturbance would occur in Colorado Plateau Mixed Bedrock Canyon and Tableland habitats, which serve as potential roosting habitat for the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat. This habitat is classified as Colorado Plateau Mixed Bedrock Canyon and Tableland. While cliff and crevice habitats are typically not disturbed by construction, development in the vicinity of these habitats is likely, and disturbance to bats that use these areas as day roost is possible.

Approximately 432 acres of shrub/scrub and riparian woodland habitats potentially used for foraging by these species would be disturbed under the No Action Alternative. Given that these species are uncommon in northeastern Utah (Oliver 2000) and there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to be a significant impact to these species. By adhering to the stated ACEPMs and successful reclamation, both interim and final, the No Action Alternative is ***not likely to result in a trend towards federal listing of the species***.

***White-tailed Prairie Dog***

Direct and indirect impacts to the white-tailed prairie dog under Alternative B would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Implementation of the No Action Alternative would result in the direct disturbance to approximately 40 acres (or approximately 0.4 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.4**, approximately 9,701 acres of prairie dog colonies are mapped within the MBPA.

Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. In addition, management protections for white-tailed prairie dog colonies contained in the approved Vernal RMP (BLM 2008a) include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. Overall, Alternative B may directly and indirectly impact individual white-tailed prairie dogs, but ***is not likely to result in a trend towards federal listing of the species***.

***Greater Sage-grouse***

Direct and indirect impacts to the greater sage-grouse under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Approximately 52 acres of sagebrush shrubland, which may provide suitable habitat for sage-grouse in the MBPA, would be disturbed under the No Action Alternative. While it is likely that some sage-grouse use portions of the MBPA on a limited basis, there is no PPH for sage-grouse within the MBPA. The nearest PPH is located approximately 0.6 mile south of the MBPA**.** Additionally, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA. Based on the information above, implementation of Alternative B may impact individual sage-grouse, but ***is not likely to result in a trend towards federal listing of the species.***

***Bald Eagle***

As discussed in **Section 3.10.2.1.6**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of Alternative B. However, implementation of the No Action Alternative may affect wintering bald eagles that roost along the Green River corridor and forage within the MBPA. These effects would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude.

Implementation of the No Action Alternative would result in the direct, initial short-term loss of approximately 683 acres suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities, which is 94 percent less than that of the Proposed Action.

Under the No Action Alternative, no new surface disturbance is proposed within 0.5 mile of identified bald eagle roosting locations. Additionally, the risk of being struck by a vehicle would decrease under the Proposed Action due to a commensurate decrease in traffic levels associated with an estimated 68.5 miles of new roads under this alternative. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles.

Overall, Alternative B may directly and indirectly impact individual bald eagles, but ***is not likely to result in a trend towards federal listing of the species***.

***Golden Eagle and Ferruginous Hawk***

Direct and indirect impacts to the golden eagle and ferruginous hawk under the Alternative B would be similar and scope and nature to those identified and assessed in **Section 4.9.1.1.6** for raptors and described under the Proposed Action, but of far less magnitude. Vegetation loss associated Alternative B would result in the loss of approximately 683 acres of habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). Additionally, approximately 95 acres of surface disturbance is proposed within

0.5 mile of identified golden eagle nests and 119 acres of disturbance is proposed within 0.5 mile of identified ferruginous hawk nests, which represents a 96 and 94 percent decrease, respectively, over that identified under the Proposed Action.

Implementation of ACEPMs and other conservation measures, including interim and final reclamation, as well as adherence to speed limits, would reduce potential impacts to golden eagles and ferruginous hawks under the No Action Alternative. Based on adherence to these measures, the No Action Alternative may affect individual golden eagles and ferruginous hawks ***but is not likely to result in a trend towards federal listing of the species.***

***Short-eared Owl***

Implementation of the Proposed Action could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only a single short-eared owl nest has been documented within the MBPA because limited nesting habitat is present within the area. Less than 1 acre of surface disturbance is proposed within 0.25 mile of this nesting site, which is approximately 14 acres less than that of the Proposed Action. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Implementation of Alternative B would likely have minimal impacts on short-eared owls. Thus, implementation of the No Action Alternative may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

***Burrowing Owl***

Direct and indirect impacts to the burrowing owl under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. The UDWR has identified and mapped approximately 9,701 acres of white-tailed prairie dog colonies within the MBPA, which serves as suitable habitat for the burrowing owl. Approximately 40 acres of this habitat would be disturbed under Alternative B. Less than 1 acre of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA, which is approximately 165 acres less than that under the pPoposed Action.

As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Based on scope and magnitude of potential impacts to the burrowing owl, the No Action Alternative may affect individual burrowing owls but ***is not likely to result in a trend towards federal listing of the species.***

***Lewis's Woodpecker***

Direct and indirect impacts to Lewis's woodpecker under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Approximately one (1) acre of riparian woodland habitat within the MBPA could be directly affected by the No Action Alternative. Implementation of the No Action Alternative would likely have minimal impacts on Lewis's woodpecker. Thus, implementation of the No Action Alternative may affect individual Lewis's woodpeckers but ***is not likely to result in a trend towards federal listing of the species.***

***American White Pelican***

Similar to the Proposed Action, the No Action Alternative would not result in the direct loss of foraging or nesting habitat to the American white pelican as no freshwater lakes, rivers, or marshlands exist within the MBPA. However, indirect impacts to the American white pelican resulting from the No Action alternative would be similar in scope and nature to those outlined in the Proposed Action, but would be far less in magnitude. Increase in erosion and subsequent sedimentation of MBPA soils into the Green River may reduce the overall habitat quality for prey species of the American white pelican. Additionally, an increase in development activity within the MBPA as a result of the No Action Alternative could result in increased noise and light impacts in adjacent foraging habitats along the Green River; although these impacts would be to a lesser extent than those described under the Proposed Action. While implementation of Alternative B may have minimal impacts on individual American white pelicans, it ***is not likely to result in a trend towards federal listing of the species.***

***Long-billed Curlew***

Direct and indirect impacts to the long-billed curlew under Alternative B would be similar in scope and nature to those identified under the Proposed Action, but far less in magnitude. Approximately 53 (<0.1 percent) acres of grassland habitat would be directly affected by the No Action Alternative within the MBPA. As there would be less development within the MBPA, there are likely to be less indirect impacts from well development, human presence and habitat fragmentation under the No Action Alternative. While implementation of the No Action Alternative may have minimal impacts on individual long-billed curlews, it ***is not likely to result in a trend towards federal listing of the species.***

***Mountain Plover***

Direct and indirect impacts to the mountain plover under the No Action Alternative would be similar in scope and nature to those described under the Proposed Action, but of far less magnitude.

The No Action Alternative would result in disturbance to approximately 386 acres of potential mountain plover habitat (or about 0.5 percent of potential habitat within the MBPA). No concentration areas for mountain plover would be impacted under Alternative B. As such, implementation of Alternative B may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

***Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker***

Direct and indirect impacts to the roundtail chub, bluehead sucker, and flannelmouth sucker under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action,

but of far less magnitude. Implementation of the No Action Alternative may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

***Barneby's Catseye***

Direct and indirect impacts to Barneby's catseye under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Under the No Action Alternative, approximately 102 acres of pinyon-juniper woodland and sagebrush communities, which serves as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 31 acres of initial disturbance (30 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under the No Action Alternative would be reduced to approximately 71 acres. As with the Proposed Action, implementation of the No Action Alternative may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Graham's Catseye***

Direct and indirect impacts to Graham's catseye under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Under the No Action Alternative, approximately 381 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 104 acres of initial disturbance (27 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under the No Action Alternative would be reduced to approximately 277 acres. As with the Proposed Action, implementation of the No Action Alternative on may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Green River Greenthread***

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited, and direct disturbance to potential habitat for this species is unlikely. Therefore, implementation of the No Action Alternative may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

***Sterile Yucca***

Direct and indirect impacts to sterile yucca under the No Action Alternative would be similar and scope and nature to those described under the Proposed Action, but of far less magnitude. Under the No Action Alternative, approximately 381 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for sterile yucca, would be impacted. Following construction, approximately 104 acres of initial disturbance (27 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under the No Action Alternative would be reduced to approximately 277 acres. As with the Proposed Action, implementation of the No Action Alternative

may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

### 4.10.1.3 Alternative C – Field-wide Electrification

#### 4.10.1.3.1 Species Listed as Federally Threatened, Endangered, or Proposed

***Western Yellow-billed Cuckoo***

Direct and indirect impacts to the WYBC under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. The overall surface disturbance to Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation that serves as potential nesting and foraging habitat for the WYBC would be approximately 20 acres, which is 1 acre more than that of the Proposed Action.

Although this alternative would have the greatest potential for direct and indirect impacts to the WYBC among all alternatives considered, ACEPMs would minimize direct impacts to suitable habitat and eliminate direct impacts to individual birds. Implementation of Alternative C ***is not likely to result in a trend towards federal listing of the species***.

***Colorado River Fish Species***

Direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. The severity of these impacts to Colorado River endangered fish species would depend on a number of factors including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

The estimated total amount of water used in drilling and completion, dust abatement, and water-flooding operations under Alternative C would be approximately 3,966 acre-feet of water annually, which is identical to what would be used under the Proposed Action. As previously mentioned under the Proposed Action, Newfield currently has secured water rights for up to 5,106 acre-feet per year. Currently, a total annual volume of 3,328 acre-feet has been authorized through these USWFS consultations (refer to **Table 2.2.8.4-1**). Water supply sources used under these previous consultations, plus the historic water rights equals a total of 3,652 acre-feet of water available for this Project. The additional 314 acre-feet of water needed under Alternative C would require additional consultation.

As with the Proposed Action, implementation of the Alternative C could also degrade USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Conservatively, assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River; Alternative C would increase sediment loading to the Green River by about 62 tons annually or by approximately 0.001 percent in the short-term.

Under Alternative C, pipelines would cross ephemeral streams at approximately 953 locations within the MBPA. For the same reasons as described under the Proposed Action, the potential for a release of contaminants into the main stem of the Green River and subsequent increased risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill is considered

to be low. The proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of Alternative C ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or "take" of an unknown number of individual fish would be anticipated. The potential also exists that portions of the designated critical habitat for these species may be adversely modified.

***Uinta Basin Hookless Cactus and Pariette Cactus***

Implementation of Alternative C would directly result in the disturbance of approximately 7,846 acres of potential habitat for *Sclerocactus* species within the MBPA, which represents approximately 1.7 percent of the total potential habitat for *Sclerocactus* species across its entire range. Following construction, approximately 4,258 acres (54 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to *Sclerocactus* species' habitat under Alternative C would be reduced to approximately 3,588 acres.

Under Alternative C, the same number of wells would be drilled within Level 1 and Level 2 Core Conservation Areas as identified under the Proposed Action; namely, 69 proposed wells in the Level 1 area and 92 proposed wells in the Level 2 area. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 951 acres of Level 1 core habitat and 1,889 acres of Level 2 core habitat within the MBPA. Following construction, approximately 57 percent of the disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Level 1 and 2 Core Conservation Areas under Alternative C would be reduced to approximately 542 and 814 acres, respectively.

Indirect and dispersed direct effects to *Sclerocactus* species (including an increased potential for the invasion and establishment of noxious weed species, impacts from herbicides used to control invasive plants in the MBPA, and possible reductions in pollination or seed dispersal from a larger road network that could result in isolated populations due to habitat fragmentation and increased dust) would be nearly identical to that previously discussed under the Proposed Action. Expansion of access roads also could also increase the risk of illegal collecting of *Sclerocactus* species.

The species-specific conservation measures (**Section 4.10.2**) for *Sclerocactus* species would include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants, and monitor the effectiveness of these measures. The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures will minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion cannot be entirely negated. These disturbances will continue to negatively impact *Sclerocactus* species throughout the MBPA. An undetermined number of individual plants will be lost. Therefore, implementation of Alternative C ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

***Ute Ladies'-tresses***

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Under Alternative C, no disturbance is proposed within riparian areas in the Pariette ACEC, and 18 wells (35.2 acres of disturbance) are proposed in wetland vegetative cover types in the Pariette ACEC. While the presence of wetlands is an important habitat quality for this species, the wetland vegetative cover includes open water and greasewood flats that do not represent suitable habitat for Ute ladies'-tresses. Direct disturbance to potential habitat for this species is unlikely because very little disturbance to wetlands or riparian floodplains are expected to occur under implementation of Alternative C and because of the conservation measures included in **Section 4.10.2**.

Implementation of Alternative C also would increase the potential for occurrence of indirect and dispersed direct effects to Ute ladies'-tresses, if present. Disturbances from construction could increase the potential for the invasion and establishment of noxious weed species. Invasion by non-native species is particularly problematic as they are capable of effective competition with native species for space, water, light, nutrients, and subsequent survival. Over time, the successful establishment of non-native species can choke out native vegetation and eventually dominate large areas. An increase in weedy annual grasses also increases the potential for fire by increasing the density and flammability of available fuels. Grasses are more flammable and establish in denser populations than woody and non-woody native vegetation.

Additional indirect construction-related impacts could include an increased potential for wind erosion of disturbed areas creating airborne dust that could be transported into suitable habitat for these species. Airborne dust generated by vehicles could inhibit photosynthesis and transpiration in these species. Inhibited and reduced rates of photosynthesis could affect the rate of growth, the reproductive capacity of individual plants, and ultimately the ability of these individuals to persist in adjacent areas. Thompson et al. (1984) and Farmer (1992) have indicated that varying amounts of dust settling on vegetation can block stomata, increase leaf temperature, and reduce photosynthesis.

No loss of individual plants is anticipated through implementation of Alternative C; however, Alternative C may result in the loss of potential habitat for this species. Therefore, Alternative C ***may affect, is not likely to adversely affect*** the Ute ladies'-tresses.

#### 4.10.1.3.2 BLM Sensitive Species and Utah State Species of Concern

***Fringed Myotis, Spotted Bat, Big Free-tailed Bat and Townsend's Big-eared Bat***

Direct and indirect impacts to the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of surface disturbance due to the installation of transmission lines and substations. Under Alternative C, approximately 478 acres (2.9 percent) of surface disturbance would occur in Colorado Plateau Mixed Bedrock Canyon and Tableland habitats, which serve as potential roosting habitat for the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat. While cliff and crevice habitats are typically not disturbed by construction, development in the vicinity of these habitats is likely, and disturbance to bats that use these areas as day roosts is possible.

Approximately 8,092 acres of shrub/scrub and riparian woodland habitats potentially used for foraging by these species would be disturbed under Alternative C. Considering these species are uncommon in

northeastern Utah (Oliver 2000) and there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to be a significant impact to these species. By adhering to the stated ACEPMs and successful reclamation, both interim and final, Alternative C is ***not likely to result in a trend towards federal listing of these species***.

***White-tailed Prairie Dog***

Direct and indirect impacts to the white-tailed prairie dog under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of total surface disturbance due to the installation of transmission lines and substations. Implementation of Alternative C would result in the direct disturbance to approximately 1,367 acres (or approximately 14 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.5**, approximately 9,701 acres of prairie dog colonies are mapped within the MBPA.

Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. In addition, management protections contained in the approved Vernal RMP (BLM 2008a) include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. Overall, Alternative C may directly and indirectly impact individual white-tailed prairie dogs, but ***is not likely to result in a trend towards federal listing of the species***.

***Greater Sage-grouse***

Direct and indirect impacts to the greater sage grouse under Alternative C would be nearly identical to those as the Proposed Action, except that Alternative C would have an additional 179 acres of total surface disturbance due to the installation of transmission lines and substations. Approximately 630 acres of sagebrush shrubland, which may provide suitable habitat for sage-grouse in the MBPA, would be disturbed under Alternative C. While it is likely that some sage-grouse use portions of the MBPA on a limited basis, there is no PPH for sage-grouse within the MBPA. The nearest PPH is located approximately 0.6 mile south of the MBPA**.** Additionally, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA.

Based on the information above, implementation of Alternative C may impact individual sage-grouse, but ***is not likely to result in a trend towards federal listing of the species.***

***Bald Eagle***

As discussed in **Section 3.10.2.1.6**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of Alternative C. However, implementation of Alternative C may affect wintering bald eagles that roost along the Green River corridor and forage within the MBPA. These effects would be nearly identical in scope, nature, and magnitude to those described under the Proposed Action.

Implementation of Alternative C would result in the direct, initial short-term loss of approximately 11,338 of acres suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities, which is approximately 1.2 percent greater than that of the Proposed Action.

Approximately 72 acres of surface disturbance is proposed within 0.5 mile of identified bald eagle roosting locations, which is 17 percent greater than that identified under the Proposed Action. The risk of

being struck by a vehicle would be virtually identical to the Proposed Action. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles.

Additionally, new power lines used to serve facilities and wells under Alternative C would pose an increased risk of electrocution and collision hazard to bald eagles. Electrocution is a well-documented source of mortality for eagles and other raptor species, and the vast majority of electrocutions involve electric distribution lines rather than high voltage transmission lines (APLIC 2006). As described in **Section 4.10.2.1**, potential impacts from increased risk of electrocution would be mitigated by designing poles according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). In addition, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

Overall, Alternative C may directly and indirectly impact individual bald eagles, but ***is not likely to result in a trend towards federal listing of the species***.

***Golden Eagle and Ferruginous Hawk***

Direct and indirect impacts to the golden eagle and ferruginous hawk under Alternative C would be similar in scope, nature, and magnitude to those identified and assessed in **Section 4.9.1.1.6** for raptors and described under the Proposed Action. Vegetation loss associated with Alternative C would result in the loss of approximately 11,338 acres of habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). Additionally, approximately 2,688 acres of surface disturbance is proposed within 0.5 mile of identified golden eagle nests and 2,181 acres of disturbance is proposed within 0.5 mile of identified ferruginous hawk nests, which is approximately 11 and 5 percent greater than that identified under the Proposed Action, respectively.

As with the bald eagle, new power lines used to serve facilities and wells under Alternative C would pose an increased risk of electrocution and collision hazard to golden eagles and ferruginous hawks. Electrocution is a well-documented source of mortality for eagles and other raptor species and the vast majority of electrocutions involve electric distribution lines rather than high voltage transmission lines (APLIC 2006). As described in **Section 4.10.2.1**, potential impacts from increased risk of electrocution would be mitigated by designing poles according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). Furthermore, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).

As with the Proposed Action, implementation of ACEPMs, as well as other conservation measures including interim and final reclamation, and adherence to speed limits, will reduce potential impacts to golden eagles and ferruginous hawks under Alternative C. Based on adherence to these measures, Alternative C may affect individual golden eagles and ferruginous hawks ***but is not likely to result in a trend towards federal listing of the species.***

***Short-eared Owl***

Implementation of the Alternative C could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging

habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only one short-eared owl nest has been documented within the MBPA because limited nesting habitat is present within the area. Approximately 19 acres of surface disturbance is proposed within 0.25 mile of this nesting site. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Unlike other raptor species, new power lines used to serve facilities and wells under Alternative C would not pose an increased risk of electrocution to short-eared owls. Implementation of Alternative C would likely have minimal impacts to short-eared owls. Thus, implementation of Alternative C may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

***Burrowing Owl***

Direct and indirect impacts to the burrowing owl under the Alternative C would be nearly identical to those described under the Proposed Action. The UDWR has identified and mapped approximately 9,701 acres of white-tailed prairie dog colonies within the MBPA, which serves as suitable habitat for the burrowing owl. Approximately 1,367 acres of this habitat would be disturbed under Alternative C. Approximately 156 acres of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA.

As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Based on scope and magnitude of potential impacts to the burrowing owl, Alternative C may affect individual burrowing owls but ***is not likely to result in a trend towards federal listing of the species.***

***Lewis's Woodpecker***

Direct and indirect impacts to Lewis's woodpecker under the Alternative C would be nearly identical to those described under the Proposed Action. Approximately 20 acres of riparian woodland habitat within the MBPA could be directly affected by Alternative C. Implementation of Alternative C would likely have minimal impacts on Lewis's woodpecker. Thus, implementation of Alternative C may affect individual Lewis's woodpeckers but ***is not likely to result in a trend towards federal listing of the species.***

***American White Pelican***

Similar to the Proposed Action, Alternative C would not result in the direct loss of foraging or nesting habitat to the American white pelican as no freshwater lakes, rivers, or marshlands exist within the MBPA. However, indirect impacts to the American white pelican resulting from Alternative C would be nearly identical in scope and nature to those outlined in the Proposed Action. Increase in erosion and subsequent sedimentation of MBPA soils into the Green River may reduce the overall habitat quality for prey species of the American white pelican. Additionally, an increase in development activity within the MBPA as a result of Alternative C could result in increased noise and light impacts in adjacent foraging

habitats along the Green River. While implementation of Alternative C may have minimal impacts on individual American white pelicans, it ***is not likely to result in a trend towards federal listing of the species.***

***Long-billed Curlew***

Direct and indirect impacts to the long-billed curlew under the Alternative C would be nearly identical to those identified under the Proposed Action. Approximately 1,129 (1 percent) acres of grassland habitat would be directly affected as a result of Alternative C within the MBPA. As the level of development within the Project would be similar to the Proposed Action, indirect impacts to long-billed curlew from well development, human presence and habitat fragmentation would likely be similar to that described under the Proposed Action. While implementation of Alternative C may have impacts on individual long-billed curlews, it ***is not likely to result in a trend towards federal listing of the species.***

***Mountain Plover***

Direct and indirect impacts to the mountain plover under Alternative C would be nearly identical to those described under the Proposed Action.
Implementation of Alternative C would result in disturbance to approximately 10,698 acres (or about 15 percent of potential habitat within the MBPA) of potential mountain plover habitat. Approximately 79 acres of concentration areas for mountain plover would be impacted under Alternative C, which is approximately 8 acres more than what would be impacted under the Proposed Action. As such, implementation of Alternative C may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

***Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker***

Direct and indirect impacts to the roundtail chub, bluehead sucker, and flannelmouth sucker under Alternative C would be nearly identical in scope and nature to those described under the Proposed Action. Implementation of Alternative C may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

***Barneby's Catseye***

Direct and indirect impacts to Barneby's catseye under the Alternative C would be similar in scope and nature to those described under the Proposed Action. Under Alternative C, approximately 1,320 acres of pinyon-juniper woodland and sagebrush communities, which serves as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 758 acres of initial disturbance (57 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under Alternative C would be reduced to approximately 562 acres. As with the Proposed Action, implementation of Alternative C may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Graham's Catseye***

Direct and indirect impacts to Graham's catseye under Alternative C would be similar and scope and nature to those described under the Proposed Action. Under Alternative C, approximately 7,596 acres of

mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 4,229 acres of initial disturbance (19 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under Alternative C would be reduced to approximately 3,367 acres. As with the Proposed Action, implementation of Alternative C may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Green River Greenthread***

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited and direct disturbance to potential habitat for this species is unlikely. Therefore, implementation of Alternative C may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

***Sterile Yucca***

Direct and indirect impacts to sterile yucca under the Alternative C would be similar and scope and nature to those described under the Proposed Action. Under Alternative C, approximately 1,533 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for sterile yucca, would be impacted. Following construction, approximately 863 acres of initial disturbance (56 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under Alternative C would be reduced to approximately 670 acres. As with the Proposed Action, implementation of Alternative C may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

### 4.10.1.4 Alternative D – Resource Protection Alternative

#### 4.10.1.4.1 Species Listed as Federally Threatened, Endangered, or Proposed

***Western Yellow-billed Cuckoo***

Direct and indirect impacts to WYBC under Alternative D would be similar in nature and scope as those described under the Proposed Action. However, the magnitude of potential impacts would be considerably less under Alternative D because 692 fewer oil and gas wells would be drilled; fewer new well pads would be constructed; the amount of new surface disturbance would be minimized through the increased use of multi-well pads and directional drilling technology; no new surface disturbance or well pad expansions would be allowed on federal lands within the Pariette Wetlands ACEC; and surface disturbance within riparian and 100-year floodplain habitats would be limited to the water collector well. This alternative would therefore have the lowest potential for impacts to WYBC of any action alternative considered. The overall initial surface disturbance to Rocky Mountain Lower Montane Riparian Woodland and Shrubland vegetation, which serves as potential nesting and foraging habitat for cuckoo would be approximately 1 acre, which is approximately 19 acres less than affected by the Proposed Action.

Because implementation of Alternative D would directly impact only 1 acre of suitable WYBC habitat, it constitutes a negligible percentage of suitable habitats available throughout the range of this species. Thus, implementation of Alternative D ***is not likely to result in a trend toward federal listing of the species***.

***Colorado River Fish Species***

Direct and indirect impacts to Colorado River endangered fish species (i.e., bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker) and their habitats under Alternative D would be similar in scope and nature to those described under the Proposed Action, but of greater magnitude with regard to water withdrawals and lesser magnitude with regard to sedimentation effects. The severity of these impacts to Colorado River endangered fish species would depend on a number of factors including the type and duration of disturbance, time of year, and implementation of recommended and required mitigation measures.

As outlined in **Section 2.6.4**, it is estimated that total water use in drilling and completion of 5,058 wells under Alternative D would be approximately 908 acre-feet of water annually. Additionally, it is estimated that Newfield would use approximately 66 acre-feet of water per year for dust abatement during project operations and up to 4,176 acre-feet per year for water-flooding operations. Thus, total water use under Alternative D would average approximately 5,153 acre-feet annually over the 20- to 30-year construction and operational period, which is approximately 1,187 acre-feet per year more than what would be used under the Proposed Action.

As previously mentioned under the Proposed Action, Newfield currently has secured water rights for up to 5,106 acre-feet per year. Currently, a total annual volume of 3,328 acre-feet has been authorized through these USWFS consultations (refer to **Table 2.2.8.4-1**). Water supply sources used under these previous consultations, plus the historic water rights equals a total of 3,652 acre-feet of water available for this Project. The additional 1,501 acre-feet of water needed under Alternative D would require additional consultation.

As with the Proposed Action, implementation of Alternative D could also degrade USFWS-designated critical habitat for Colorado River fish in the Green River by increasing erosion and sediment yield. Conservatively, assuming that all sediment delivered to Pariette Draw and other drainages within the MBPA is eventually transported to the Green River; Alternative D would increase sediment loading to the Green River by about 56 tons annually or by approximately 0.001 percent in the short-term. This represents approximately a 6 ton decrease as compared to that under the Proposed Action.

Under Alternative D, pipelines would cross ephemeral streams at approximately 868 locations within the MBPA. Surface disturbance in riparian habitats and the floodplain would be limited to the water collector well. Therefore, the potential for a release of contaminants into the main stem of the Green River and subsequent increased risk of acute or chronic toxicity to endangered fish in the Green River in the event of a natural-gas condensate spill is considered to be low. The proposed mitigation measures described in **Section 4.10.2.3** would preclude the development of wells in the floodplain.

Based on the projected water depletions and the increase in yields of the Green River, implementation of Alternative D ***may affect, is likely to adversely affect*** the listed Colorado River fish species, bonytail chub, Colorado pikeminnow, humpback chub, and razorback sucker and their habitat. The loss or "take" of an unknown number of individual fish would be anticipated. The potential also exists that portions of the designated critical habitat for these species may be adversely modified.

***Uinta Basin Hookless Cactus and Pariette Cactus***

Implementation of Alternative D would directly result in the disturbance of approximately 4,307 acres of potential habitat for *Sclerocactus* species within the MBPA, which represents approximately 1 percent of the total potential habitat for *Sclerocactus* species across their entire range. Following construction, approximately 3,117 acres (72 percent) of land associated with the construction of the well pads, access roads, and pipeline ROWs not needed for operation purposes would be reclaimed. If reclamation is successful, the long-term disturbance to *Sclerocactus* species' habitat under Alternative D would be reduced to approximately 1,439 acres, which is approximately 1,190 acres or 65 percent less than that under the Proposed Action.

Under Alternative D, no new surface disturbance or well pad expansions would occur within Level 1 Core Conservation Areas of the Pariette Wetlands ACEC. In Level 2 areas located outside the Pariette Wetlands ACEC, surface disturbance would be minimized to the greatest extent practicable by using existing infrastructure (i.e., access roads and pipelines) and directional drilling from multi-well pads that would either require the expansion of existing well pads or the construction of a limited number of new multi-well pads. Under Alternative D, Approximately 647 proposed wells would be drilled within Level 2 Core Conservation Areas for *Sclerocactus* species. The development of these wells along with associated road and pipeline installation would initially result in direct short-term loss of approximately 1,093 acres of Level 2 Core Conservation Area habitat within the MBPA. Under Alternative D, approximately 69 and 123 fewer well locations would be drilled and 946 and 760 fewer acres of initial surface disturbance would occur within Level 1 and 2 Core Conservation Areas, respectively, than under the Proposed Action.

Under Alternative D, the conversion of existing well pads to injection water wells would further reduce surface disturbance in Level 2 Core Conservation Areas over the long-term by reducing existing infrastructure to smaller disturbance areas. This would help reduce the disturbance in Level 2 Core Conservation Areas that already exceed the 5 percent surface disturbance density ceiling. Following construction, approximately 76 percent of the disturbance associated with construction of proposed well pads, portions of access roads, and pipeline ROWs not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance to Level 2 Core Conservation Areas under Alternative D would be reduced to approximately 262 acres.

Indirect and dispersed direct effects to *Sclerocactus* species (including an increased potential for the invasion and establishment of noxious weed species, impacts from herbicides used to control invasive plants in the MBPA, and possible reductions in pollination or seed dispersal from a larger road network that could result in isolated populations due to habitat fragmentation and increased dust) would be similar to that previously discussed under the Proposed Action. However, the magnitude of indirect impacts would be comparatively less because 3,455 fewer acres of potential habitat for *Sclerocactus* species would be impacted in the long-term under Alternative D as compared to those under the Proposed Action.

Additional species-specific conservation measures for *Sclerocactus* species under Alternative D (beyond those included in **Section 4.10.2**) include provisions to avoid all new surface disturbances to Level 1 Core Conservation Areas and limit the disturbance to Level 2 Core Conservation Areas through the use of existing multi-well pads and roads, and increased use of directional drilling technology. The proposed mitigation measures for *Sclerocactus* species are described in **Section 4.10.2.5**.

Although these measures would minimize the impacts of the action to *Sclerocactus* species, larger landscape-level changes such as increased habitat fragmentation and habitat loss, pollinator disturbance, changes in erosion and water runoff, and increased weed invasion cannot be entirely negated. These disturbances could continue to negatively impact *Sclerocactus* species throughout the MBPA, although at a substantially reduced level as compared to those under the Proposed Action. An undetermined number of individual plants could be lost; therefore, implementation of Alternative D ***may affect, is likely to adversely affect*** the Uinta Basin hookless cactus and Pariette cactus and their habitats.

***Ute Ladies'-tresses***

There are no documented occurrences of Ute ladies'-tresses in the MBPA. Habitat for the Ute ladies'-tresses in the MBPA is generally confined to portions of the Pariette Wetlands. Direct disturbance to potential habitat for this species is unlikely because no disturbance to wetlands or riparian areas in the Pariette ACEC is expected to occur under implementation of Alternative D. For the same reasons, the potential for occurrence of indirect and dispersed direct effects to this species from the Alternative D would be unlikely to occur.

The species-specific conservation measures for Ute ladies'-tresses include provisions to avoid occupied habitat, employ the use of spatial buffers between surface activities and known populations of plants and monitor the effectiveness of these measures. The proposed mitigation measures for Ute ladies'-tresses are described in **Section 4.10.2.5**.

No loss of individual plants is anticipated through implementation of Alternative D, nor is Alternative D anticipated to impact suitable habitat for this species. Therefore, Alternative D ***is not likely to adversely affect*** the Ute ladies'-tresses.

#### 4.10.1.4.2 BLM Sensitive Species and Utah State Species of Concern

***Fringed Myotis, Spotted Bat, Big Free-tailed Bat and Townsend's Big-eared Bat***

Direct and indirect impacts to the fringed myotis, spotted bat, big free-tailed bat and Townsend's big-eared bat under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 144 acres (1.4 percent) of surface disturbance would occur in Colorado Plateau Mixed Bedrock Canyon and Tableland habitats, which serve as potential roosting habitat for the fringed myotis, big free-tailed bat spotted bat, and Townsend's big-eared bat. This habitat is classified as Colorado Plateau Mixed Bedrock Canyon and Tableland. While cliff and crevice habitats are typically not disturbed by construction, development in the vicinity of these habitats is likely, and disturbance to bats that use these areas as day roosts is possible.

Approximately 4,630 acres of shrub/scrub and riparian woodland habitats potentially used for foraging by these species would be disturbed under the Alternative D. Considering these species are uncommon in northeastern Utah (Oliver 2000) and there is a relative abundance of foraging habitat in the adjacent habitats within the MBPA, the loss of foraging habitat is not anticipated to be a significant impact to these species. By adhering to the stated ACEPMs and successful reclamation, both interim and final, Alternative D is ***not likely to result in a trend towards federal listing of the species***.

***White-tailed Prairie Dog***

Direct and indirect impacts to the white-tailed prairie dog under the Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. Implementation of the Alternative D would result in the direct disturbance to approximately 770 acres (or approximately 8 percent) of mapped white-tailed prairie dog colonies within the MBPA. As discussed in **Section 3.10.2.1.5**, approximately 9,701 acres of prairie dog colonies are mapped within the MBPA.

Successful interim and final reclamation efforts could re-establish some of the white-tailed prairie dog habitat over time. In addition, management protections contained in the approved Vernal RMP (BLM 2008a) include provisions to minimize impacts to white-tailed prairie dog colonies within the Myton Complex during construction, which could further reduce impacts related to habitat loss and fragmentation in the MBPA. Overall, Alternative D may directly and indirectly impact individual white-tailed prairie dogs, but ***is not likely to result in a trend towards federal listing of the species***.

***Greater Sage-grouse***

Direct and indirect impacts to the greater sage-grouse under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. Approximately 1,825 acres of sagebrush shrubland, which may provide suitable habitat for sage-grouse in the MBPA, would be disturbed under Alternative D. While it is likely that some sage-grouse use portions of the MBPA on a limited basis, there is no PPH for sage-grouse within the MBPA. The nearest PPH is located approximately 0.6 mile south of the MBPA**.** Additionally, there are no habitats designated as occupied, brood rearing, or winter habitats for sage-grouse within the MBPA. Based on the information above, implementation of Alternative D may impact individual sage-grouse, but ***is not likely to result in a trend towards federal listing of the species.***

***Bald Eagle***

As discussed in **Section 3.10.2.1.7**, no bald eagle nests have been documented in the MBPA. Therefore, direct and indirect impacts to bald eagle nests or nesting activity are not anticipated as a result of Alternative D. However, implementation of Alternative D may affect wintering bald eagles that roost along the Green River corridor and forage within the MBPA. These effects would be similar and scope and nature to those described under the Proposed Action, but of less magnitude.

Implementation of the Alternative D would result in the direct, initial short-term loss of approximately 6,103 acres suitable habitat for prey species during the construction of roads, pipelines, well pads, and ancillary facilities, which is 45 percent less than that of the Proposed Action.

Under Alternative D, no new surface disturbance is proposed within 0.5 mile of identified bald eagle roosting locations. Additionally, the risk of being struck by a vehicle would decrease under the Proposed Action due to a commensurate decrease in traffic levels associated with an estimated 606 miles of new roads under this alternative. Measures to control speed limits and adherence to the removal of big game carcasses from roadsides would be implemented to reduce the potential for vehicle-related collisions with bald eagles.

Overall, Alternative D may directly and indirectly impact individual bald eagles, but ***is not likely to result in a trend towards federal listing of the species***.

### *Golden Eagle and Ferruginous Hawk*

Direct and indirect impacts to the golden eagle and ferruginous hawk under Alternative D would be similar and scope and nature to those identified and assessed in **Section 4.9.1.1.6** for raptors and described under the Proposed Action, but of less magnitude. Vegetation loss associated with Alternative D would result in the loss of approximately 6,103 acres of potential habitat for prey species (e.g., ground squirrels, prairie dogs, and rabbits). Additionally, approximately 1,790 acres of surface disturbance is proposed within 0.5 mile of identified golden eagle nests and 1,394 acres of disturbance is proposed within 0.5 mile of identified ferruginous hawk nests, which represents a 25 and 67 percent decrease, respectively, over that identified under the Proposed Action.

As with the Proposed Action, implementation of ACEPMs and other conservation measures, including interim and final reclamation, as well as adherence to speed limits, would reduce potential impacts to golden eagles and ferruginous hawks under Alternative D. Based on adherence to these measures, Alternative D may affect individual golden eagles and ferruginous hawks but ***is not likely to result in a trend towards federal listing of the species.***

### *Short-eared Owl*

Implementation of the Alternative D could result in direct and indirect impacts to the short-eared owl. Direct impacts to short-eared owls could primarily include loss and fragmentation of nesting and foraging habitats. Indirect impacts could include displacement from foraging areas and reduction of prey species' habitat.

Only a single short-eared owl nest has been documented within the MBPA because limited nesting habitat is present within the area. Approximately 7 acres of surface disturbance is proposed within 0.25 mile of this nesting site, which is approximately 8 acres less than that of the Proposed Action. As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for short-eared owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If short-eared owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Implementation of Alternative D would likely have minimal impacts on short-eared owls. Thus, implementation of the Alternative D may affect individual short-eared owls but ***is not likely to result in a trend towards federal listing of the species.***

### *Burrowing Owl*

Direct and indirect impacts to the burrowing owl under the Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. The UDWR has identified and mapped approximately 11,647 acres of white-tailed prairie dog colonies within the MBPA, which serves as habitat for the burrowing owl. Approximately 770 acres of this habitat would be disturbed under Alternative D. Approximately 92 acres of surface disturbance would occur within 0.25 mile of known burrowing owl nests within the MBPA, which is approximately 74 acres less than that under the Proposed Action.

As described in **Section 4.10.2.1**, the approved Vernal RMP (BLM 2008b) has established a seasonal and spatial restriction for burrowing owls of 0.25 mile during the active breeding season (i.e., March 1 to August 31). If burrowing owls are documented within a 0.25 mile of any proposed project activities, surface disturbing activities would not commence until after August 31. Thus, direct impacts on active burrowing owl nests would be avoided. Based on scope and magnitude of potential impacts to the

burrowing owl, Alternative D may affect individual burrowing owls but is ***not likely to result in a trend towards federal listing of the species.***

***Lewis's Woodpecker***

Direct and indirect impacts to Lewis's woodpecker under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. Approximately 3 acres of riparian woodland habitat within the MBPA could be directly affected under Alternative D. Implementation of Alternative D would likely have minimal impacts on Lewis's woodpecker. Thus, implementation of this alternative may affect individual Lewis's woodpeckers but ***is not likely to result in a trend towards federal listing of the species.***

***American White Pelican***

Similar to the Proposed Action, Alternative D would not result in the direct loss of foraging or nesting habitat to the American white pelican as no freshwater lakes, rivers, or marshlands exist within the MBPA. However, indirect impacts to the American white pelican resulting from Alternative D would be similar in scope and nature to those outlined in the Proposed Action, but would be far less in magnitude. Increase in erosion and subsequent sedimentation of MBPA soils into the Green River may reduce the overall habitat quality for prey species of the American white pelican. Additionally, an increase in development activity within the MBPA as a result of Alternative D could result in increased noise and light impacts in adjacent foraging habitats along the Green River; although these impacts would be to a lesser extent than those described under the Proposed Action. While implementation of Alternative D may have minimal impacts on individual American white pelicans, it ***is not likely to result in a trend towards federal listing of the species.***

***Long-billed Curlew***

Direct and indirect impacts to the long-billed curlew under Alternative D would be similar in scope and nature to those identified under the Proposed Action, but far less in magnitude. Approximately 584 (0.5 percent) acres of grassland habitat would be directly affected by Alternative D within the MBPA. As there would be less development within the MBPA, there are likely to be fewer indirect impacts from well development, human presence and habitat fragmentation under Alternative D. While implementation of the No Action Alternative may have minimal impacts on individual long-billed curlew, it ***is not likely to result in a trend towards federal listing of the species.***

***Mountain Plover***

Direct and indirect impacts to the mountain plover under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude.

Implementation of Alternative D would result in disturbance to approximately 6,900 acres (or about 9 percent of potential habitat within the MBPA) of potential mountain plover habitat. Approximately 56 acres of concentration areas for mountain plover would be impacted under Alternative D, which is 56 acres less than that of the Proposed Action. As such, implementation of Alternative D may impact individual mountain plovers but ***is not likely to result in a trend towards federal listing of the species.***

***Roundtail Chub, Bluehead Sucker, and Flannelmouth Sucker***

Direct and indirect impacts to the roundtail chub, bluehead sucker, and flannelmouth sucker under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude, especially as surface disturbance within riparian habitats and floodplains would be limited to the water collector well. Implementation of Alternative D may impact individual Colorado River sensitive fish species but ***is not likely to result in a trend towards federal listing of the species.***

***Barneby's Catseye***

Direct and indirect impacts to Barneby's catseye under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 786 acres of pinyon-juniper woodland and sagebrush communities, which serves as potential habitat for Barneby's catseye, would be impacted. Following construction, approximately 609 acres of initial disturbance (77 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of pinyon-juniper woodland and sagebrush communities under Alternative D would be reduced to approximately 177 acres. As with the Proposed Action, implementation of Alternative D may impact individual Barneby's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Graham's Catseye***

Direct and indirect impacts to Graham's catseye under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 4,470 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for Graham's catseye, would be impacted. Following construction, approximately 2,040 acres of initial disturbance (46 percent) associated with construction of proposed well pad, portions of the access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, desert scrub, and pinyon-juniper woodland vegetation under Alternative D would be reduced to approximately 1,089 acres. As with the Proposed Action, implementation of Alternative D may impact individual Graham's catseyes but ***is not likely to result in a trend towards federal listing of the species.***

***Green River Greenthread***

Since Green River greenthread is generally confined to white shale slopes and ridges at elevations greater than 5,900 feet in elevation, its potential distribution within the MBPA is extremely limited and direct disturbance to potential habitat for this species is unlikely. Therefore, implementation of Alternative D may impact individual Green River greenthreads but ***is not likely to result in a trend towards federal listing of the species.***

***Sterile Yucca***

Direct and indirect impacts to sterile yucca under Alternative D would be similar and scope and nature to those described under the Proposed Action, but of less magnitude. Under Alternative D, approximately 910 acres of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation, which serves as potential habitat for sterile yucca, would be impacted. Following construction, approximately 694 acres of initial disturbance (76 percent) associated with construction of proposed well pad, portions of the

access road, and pipeline ROW not needed for operational purposes would be reclaimed. If reclamation is successful, the long-term disturbance of mixed sagebrush, salt desert scrub, and pinyon-juniper woodland vegetation under Alternative D would be reduced to approximately 216 acres. As with the Proposed Action, implementation of Alternative D may impact individual sterile yuccas but ***is not likely to result in a trend towards federal listing of the species.***

## 4.10.2 Mitigation

In addition to the ACEPMs detailed in **Sections 2.2.12.5** and **2.2.12.7**, there are several proposed conservation measures that could be used to reduce residual impacts to special status plant, fish, and wildlife species. These mitigation measures are detailed in the subsections below.

### 4.10.2.1 Mitigation Measures for Special Status Raptor Species, Including the Bald Eagle, Golden Eagle, Ferruginous Hawk, Burrowing Owl, Mountain Plover, and Short-eared Owl

- Project-related development in areas directly associated with raptor nest and roost areas would be guided by the use of *Best Management Practices for Raptors and Their Associated Habitats in Utah* (Appendix A in BLM 2008c) and the USFWS Utah Raptor Protection Guidelines using seasonal and spatial buffers as well as mitigation to maintain and enhance raptor nesting and foraging habitat, while allowing for other resource uses.

- All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.
- Electric distribution and transmission structures would be designed according to criteria presented in *Suggested Practices for Raptor Protection on Power Lines: the State of the Art in 2006* (APLIC 2006). In addition, strategies for minimizing collision risk with power lines would follow criteria presented in *Reducing Avian Collisions with Power Lines: the State of the Art in 2012* (APLIC 2012).
- Between March 1 and August 31, new construction or surface-disturbing activities would not occur within 0.25 miles of active burrowing owl and short-eared owl nests.
- Between May 1 and June 15, new construction or surface-disturbing activities would not occur in mountain plover habitat to protect the species during the breeding and nesting season.

### 4.10.2.2 Mitigation Measures for Colorado River System Endangered and Sensitive Fish

- Newfield and its contractors would locate, handle, and store hazardous substances in locations that would prevent accidental spill or delivery to the Green River or its tributaries.
- Natural gas-condensate pipelines that cross mapped 100-year floodplain, mapped riparian, or wetland areas would be routinely pigged and would have emergency shutoff valves located immediately outside the floodplain.
- Natural gas pipelines that cross perennial, intermittent, and ephemeral stream channels would be buried below the predicted scour depth for an equivalent flood event. The construction requirements for each type of crossing would be determined on a site-specific basis and would consider the technical guidance of the document entitled,

"Hydraulic Considerations for Pipeline Crossings of Stream Crossings," which is found in Appendix B of the Vernal RMP (BLM 2008c).

- Natural gas pipelines that cross perennial, intermittent, and ephemeral stream channels would have automatic shutoff valves directly beyond the area at risk of flooding to reduce the magnitude of contamination in the event of an accidental pipeline break.
- Natural gas pipelines that cross perennial, intermittent, and ephemeral stream channels would be buried at least 5 feet below the channel bottom.
- With the exception of the water collector well, wells proposed within the Green River's 100-year floodplain would be relocated to non-floodplain areas or drilled directionally from beyond the floodplain.
- Wells proposed in all 100-year floodplains within 3 miles of the Green River would use measures including the use of closed-loop drilling methods, berming, and secondary containment of all tanks and pits, as well as drilling during non-flood prone seasons.
- All applicable BLM-committed Conservation Measures for Colorado River fishes, as described in Appendix L of the Vernal RMP (BLM 2008c), would be used as needed to mitigate potential impacts to endangered and sensitive fishes and their habitat.
- To avoid entrainment, water would be pumped from an off-channel location—one that does not connect to the river during high spring flows. An infiltration gallery constructed in a location approved by USFWS would be used.
- If the pump head is located in the river channel the following stipulations would apply:
    - The pump would not be situated in a low-flow or no-flow area because these habitats tend to concentrate larval fishes.
    - The amount of pumping would be limited, to the greatest extent possible, during that period of the year when larval fish may be present (April 1- August 31).
    - The amount of pumping would be limited, to the greatest extent possible, during the midnight hours (10 PM to 2 AM) because as larval drift studies indicate that this is a period of greatest daily activity. Dusk is the preferred pumping time because larval drift abundance is lowest during this time.
    - All pump intakes would be screened with 3/32-inch mesh material.
    - Approach velocities for intake structures would follow the National Marine Fisheries and USFWS document "Fish Screening Criteria for Anadromous Salmonids." For projects with an in-stream intake that operate in stream reaches where larval fish may be present, the approach velocity would not exceed 0.33 feet per second.
    - Any fish impinged on the intake screen or entrained into irrigation canals would be reported to the USFWS (801-975-3330) or the UDWR Northeastern Region, located at 318 North Vernal Avenue, Vernal, UT 84078 (435-781-9453).
- For all tributaries that drain directly to Pariette Draw or directly to the Green River, roads and well pads will be set back a minimum of 300 feet from the active stream channel (average 3-feet wide or greater without an associated riparian zone) unless site specific analysis demonstrates that: 1) the proposed well or road could be placed on higher terrain above the 100-year floodplain, 2) the 100-year floodplain can be demonstrated to be

narrower than 200 feet in the area proposed for well location; or 3) the well pad or road can be increased in height to avoid a predicted over-topping 50-year flood. In these situations, the well pad or road would not be placed closer than 100 feet from the stream channel.

- All new stream crossings would be kept to a minimum. In the case of an unavoidable stream crossing, culverts will be designed and constructed to allow fish passage. All stream crossings will be designed and constructed to keep impacts to riparian and aquatic habitat to a minimum.
- Appropriate BMPs needed to mitigate water impacts anticipated to occur from surface disturbing activities will be identified during the onsite and may include, but would not be limited to: proper culvert design, installation of energy dissipation devices, proper site selection (avoidance of: steep slopes, riparian areas, wetlands, areas subject to severe soil movement, and areas of shallow groundwater and natural watercourses), and using closed-loop drilling.

#### 4.10.2.3 Mitigation Measures for Special Status Plant Species, Including the Uinta Basin Hookless Cactus, Pariette Cactus, Ute Ladies'-tresses, Barneby's Catseye, Graham's Catseye, and Sterile Yucca

1) In order to minimize effects to the federally threatened Uinta Basin hookless cactus, the BLM in coordination with the USFWS, developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including, but not limited to, drilling, production, and maintenance) are in compliance with the ESA. These include:

   A. Pre-project habitat assessments will be completed across 100 percent of the project disturbance area within potential habitat[6] prior to any ground disturbing activities to determine if suitable Uinta Basin hookless cactus habitat is present.

   B. Within suitable habitat[7], site inventories will be conducted to determine occupancy. Inventories:

      a. Must be conducted by qualified individual(s) and according to BLM and USFWS-accepted survey protocols;

      b. Will be conducted in suitable and occupied habitat[8] for all areas proposed for surface disturbance prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods:

[6] *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
[7] *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Uinta Basin hookless cactus. Habitat descriptions can be found in the U.S. Fish and Wildlife Service's 1990 Recovery Plan and Federal Register Notices for the Uinta Basin hookless cactus (http://www.fws.gov/endangered/wildlife.html).
[8] *Occupied habitat* is defined as areas currently or historically known to support Uinta Basin hookless cactus; synonymous with "known habitat."

i. *Sclerocactus brevispinus* surveys should be conducted March 15th to June 30th, unless extended by the BLM

ii. *Sclerocactus wetlandicus* surveys can be done any time of the year, provided there is no snow cover;

c. Will occur within 300 feet from the edge of the proposed ROW for surface pipelines or roads, and within 300 feet from the perimeter of disturbance for the proposed well pad including the well pad;

d. Will include, but is not be limited to, plant species lists and habitat characteristics; and

e. Will be valid until March 15th the following year for *Sclerocactus brevispinus* and one year from the survey date for *Sclerocactus wetlandicus*.

C. Design project infrastructure to minimize impacts within suitable habitat:

a. Reduce well pad size to the minimum needed, without compromising safety;

b. Limit new access routes created by the project;

c. Roads and utilities should share common ROWs where possible;

d. Reduce width of ROWs and minimize the depth of excavation needed for the road bed and where feasible, use the natural ground surface for the road within habitat;

e. Place signing to limit off-road travel in sensitive areas;

f. Stay on designated routes and other cleared/approved areas; and

g. All disturbed areas will be re-vegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas.

D. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

a. Follow the above (#C) recommendations for project design within suitable habitats;

b. Buffers of 300 feet minimum between the edge of the ROW (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated;

c. Surface pipelines will be laid such that a 300-foot buffer exists between the edge of the ROW and the plants and use stabilizing and anchoring techniques when the pipeline crosses the habitat to ensure the pipelines do not move towards the population;

d. Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.;

e. Where technically and economically feasible, use directional drilling or multiple wells from the same pad;

f. Designs will avoid concentrating water flows or sediments into occupied habitat;

g. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat;

h. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible;

i. Re-initiation of Section 7 consultation with the USFWS will be sought immediately if any loss of plants or occupied habitat for the Uinta Basin hookless cactus is anticipated as a result of project activities.

j. New disturbances within core conservation areas may be associated with additional mitigation measures (for example, payment into the cactus mitigation fund) that will be developed in consultation with the USFWS.

Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the USFWS to ensure continued compliance with the ESA.

2) In order to minimize effects to the federally threatened Ute ladies'-tresses, the BLM in coordination with the USFWS, developed the following avoidance and minimization measures. Integration of and adherence to these measures will help ensure the activities carried out during oil and gas development (including but not limited to drilling, production, and maintenance) are in compliance with the ESA. Ute ladies'-tresses habitat is provided some protection under EOs 11990 (wetland protection) and 11988 (floodplain management), as well as Section 404 of the CWA Act. Although plants, habitat, or populations may be afforded some protection under these regulatory mechanisms, the following conservation measures should be included in the POD:

A. Pre-project habitat assessments will be completed across 100 percent of the project disturbance area, including areas where hydrology might be affected by project activities, within potential habitat[9] prior to any ground disturbing activities to determine if suitable Ute ladies'-tresses habitat is present.

B. Within suitable habitat[10], site inventories will be conducted to determine occupancy. Inventories:

a. Must be conducted by qualified individual(s) and according to BLM and USFWS-accepted survey protocols;

b. Will be conducted in suitable and occupied habitat[11] for all areas proposed for surface disturbance or areas that could experience direct or indirect changes in hydrology from project activities;

c. Will be conducted prior to initiation of project activities and within the same growing season, at a time when the plant can be detected, and during appropriate flowering periods (usually August 1st and August 31st in the Uinta Basin; however, surveyors should verify that the plant is flowering by contacting a BLM or USFWS botanist or demonstrating that the nearest known population is in flower);

[9] *Potential habitat* is defined as areas which satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment.
[10] *Suitable habitat* is defined as areas which contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain Uinta Basin hookless cactus. Habitat descriptions can be found in the U.S. Fish and Wildlife Service's 1990 Recovery Plan and Federal Register Notices for the Uinta Basin hookless cactus (http://www.fws.gov/endangered/wildlife.html).
[11] *Occupied habitat* is defined as areas currently or historically known to support Uinta Basin hookless cactus; synonymous with "known habitat."

d. Will occur within 300 feet from the edge of the proposed ROW for surface pipelines or roads; and within 300 feet from the perimeter of disturbance for the proposed well pad including the well pad;

e. Will include, but not be limited to, plant species lists, habitat characteristics, source of hydrology, and estimated hydroperiod; and

f. Will be valid until August 1st the following year.

C. Design project infrastructure to minimize direct or indirect impacts to suitable habitat both within and downstream of the MBPA:

a. Alteration and disturbance of hydrology will not be permitted;

b. Reduce well pad size to the minimum needed, without compromising safety;

c. Limit new access routes created by the project;

d. Roads and utilities should share common ROWs where possible;

e. Reduce width of ROWs and minimize the depth of excavation needed for the road bed;

f. Construction and ROW management measures should avoid soil compaction that would impact Ute ladies'-tresses habitat;

g. Offsite impacts or indirect impacts should be avoided or minimized (i.e. install berms or catchment ditches to prevent spilled materials from reaching occupied or suitable habitat through either surface or groundwater);

h. Place signing to limit off-road travel in sensitive areas;

i. Stay on designated routes and other cleared/approved areas; and

j. All disturbed areas will be re-vegetated with species approved by USFWS and BLM botanists.

D. Within occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts to populations and to individual plants:

a. Follow the above (#C) recommendations for project design within suitable habitats;

b. Buffers of 300 feet between ROW (roads and surface pipelines) or surface disturbance (well pads) and plants and populations will be incorporated;

c. Surface pipelines will be laid such that a 300-foot buffer exists between the edge of the ROW and the plants, using stabilizing and anchoring techniques when the pipeline crosses habitat to ensure the pipelines don't move towards the population;

d. Before and during construction, areas for avoidance should be visually identifiable in the field (e.g., flagging, temporary fencing, rebar, etc.);

e. Where technically and economically feasible, use directional drilling or multiple wells from the same pad;

f. Designs will avoid altering site hydrology and concentrating water flows or sediments into occupied habitat;

g. Place produced oil, water, or condensate tanks in centralized locations, away from occupied habitat, with berms and catchment ditches to avoid or minimize the potential for materials to reach occupied or suitable habitat; and

h. Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible.

i. Occupied Ute ladies'-tresses habitats within 300 feet of the edge of the surface pipelines' ROWs, 300 feet of the edge of the roads' ROWs, and 300 feet from the edge of the well pad shall be monitored for a period of three years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Habitat impacts include monitoring any changes in hydrology due to project related activities. Annual reports shall be provided to the BLM and the USFWS. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the USFWS.

j. Re-initiation of Section 7 consultation with the USFWS will be sought immediately if any loss of plants or occupied habitat for the Ute ladies'-tresses is anticipated as a result of project activities.

Additional site-specific measures may also be employed to avoid or minimize effects to the species. These additional measures will be developed and implemented in consultation with the USFWS to ensure continued compliance with the ESA.

3) A pre-project weed inventory would be conducted before commencing with ground disturbing activities.

4) Invasive plant weed inventories would be conducted annually in all disturbed areas.

5) Invasive plant control measures (mechanical, cultural, chemical) would be conducted before seed set each year. Some populations may require more than one treatment per year. Manual pulling around threatened and endangered species would be done as necessary and as directed by the AO.

6) All areas not used for the operational phase of the project would be reseeded (to provide noxious weed control).

7) When the management plan for the Pariette and Uinta Basin Hookless cactus is finalized, additional measures to avoid or minimize effects to the species may be developed and implemented in consultation with the USFWS to ensure compliance with the ESA.

8) Dust palliatives (other than gravel and water) would be used at the direction of the AO.

9) All applicable surface stipulations from Appendix K and Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.

#### 4.10.2.4 Mitigation Measures for the White-Tailed Prairie Dog

In accordance with the Conditional Use Stipulations included in Appendix K of the Vernal RMP and ROD:

- Do not allow surface-disturbing activities within 660 feet of prairie dog colonies identified within prairie dog habitat. No permanent aboveground facilities are allowed within the 660-foot buffer.

- Exception: An exception may be granted if the applicant submits a plan that indicates that impacts of the proposed action can be adequately mitigated or, if due to the size of the town, there is no reasonable location to develop a lease and avoid colonies the Field Manager will allow for loss of prairie dog colonies and/or habitat to satisfy terms and conditions of the lease.
- Modification: The Field Manager may modify the boundaries of the stipulation area if portions of the area does not include prairie dog habitat or active colonies are found outside the current defined area, as determined by the BLM.
- Waiver: May be granted if, in the leasehold, it is determined that habitat no longer exists or has been destroyed.

### 4.10.3 Unavoidable Adverse Impacts

Adverse impacts to special status plant, fish, and wildlife species would occur under all of the alternatives to varying degrees, depending on the number of wells. Unavoidable adverse impacts from the proposed project that could not be fully mitigated include the following:

- Long-term losses of potential habitat useful for the survival or recovery of special status plant, fish, and wildlife species.
- Fragmentation of special status plant, fish, and wildlife habitat from well pads, pipelines, roads, and ancillary features.
- Water depletion from the Colorado River Basin resulting in impacts to Colorado River endangered and sensitive fish species.

### 4.10.4 Irretrievable and Irreversible Commitments of Resources

Any losses of potential habitat necessary for the survival or recovery of special status plant, fish, and wildlife species would be irretrievable until disturbed areas were actively and adequately restored. The fragmentation of habitat for special status plant, fish, and wildlife species from well pads, pipelines, roads, and ancillary features would be irretrievable until these features were removed and reclaimed following project completion. The increased spread of invasive weeds into the habitat of special status species would be either irretrievable or irreversible, depending on the success of weed eradication efforts. Impacts related to the depletion of flows and increased sedimentation in the Green River would be an irreversible impact. Where the alteration of plant habitat cannot be reclaimed, such as the disturbance of BSCs or other soils required by special status plants, these impacts would be irreversible as well.

### 4.10.5 Relationship of Short-Term Uses to Long-Term Productivity

Construction of roads, well pads, pipelines, and ancillary facilities would provide a short-term use that would result in long-term loss and fragmentation of habitat for special status species. Noxious weed invasion into the habitat of special status plant, fish, and wildlife species would also be a long-term effect of the construction and project-related activities, and could affect the long-term productivity of habitats that are invaded.

# 4.11 CULTURAL RESOURCES

Under all alternatives, adverse effects to historic properties in the MBPA would include an increased risk of physical alteration, damage, or destruction, and/or alteration of the character or setting of a property. These effects would result from activities associated with surface or subsurface disturbance (i.e., road building, pipeline construction, and well-pad development). This would also apply to archaeological sites or locations determined to be sacred or of traditional importance to Native American tribes where visual impacts, dust, traffic, and/or increased noise levels may impact that use.

Potential adverse effects to cultural resources as a result of the proposed project are minimized through compliance with Section 106 of the NHPA and through compliance with ACEPMs detailed in **Section 2.2.12.8**. Compliance with Section 106 mandates the identification of historic properties within the development area that may be affected under each of the alternatives and provides a framework for consultation to resolve adverse effects.

The ACEPMs for this project reinforce Section 106 requirements. These proposed measures specifically include:

- Consultation with SHPO and Native American Tribes
- A Class III inventory for all areas proposed for surface disturbance
- Avoidance of NRHP-eligible historic properties whenever feasible
- Mitigation of adverse effects
- Informing workers about relevant regulations
- Cessation of construction activities in the event of archaeological discoveries

## 4.11.1 Direct and Indirect Effects

Cultural resources located in the MBPA are non-renewable, and if not known or detected, they could be directly affected and irreversibly damaged or destroyed by ground-disturbing activities such as well pad development, road construction, and secondary surface activities (e.g., vehicular and pedestrian traffic). Because there is the potential for archaeological sites in the MBPA to be shallow, these cultural deposits could also be damaged or destroyed by vegetation clearing, right-of-way blading, or soils excavation. Standing historic buildings or structures are more visible than archaeological deposits and are more easily avoided during ground-disturbing activities.

Historic and prehistoric cultural resources may also be subject to indirect effects, including an increased risk of vandalism, surface artifact collection, visual intrusion, unauthorized excavation, and OHV traffic because of improved access to the area from new and upgraded roads or production and distribution lines. Fugitive dust has the potential to affect cultural resources by coating artifacts, features, and rock art panels with dust. Typical dust suppression methods, including the application of water or chemical suppressants to unimproved roads, are generally sufficient to limit the distance dust travels from its point of origin. As such, those sites directly adjacent to roads or similar facilities would be most at risk.

Direct and indirect effects could result in the loss of research potential or enhancement through scientific study; the loss of recreational opportunities and interpretation; the loss of management options for the BLM; or the alienation of place, setting, and feeling. The degree of threat to cultural resource sites would

depend on their location relative to proposed project facilities and new access roads and the efforts taken by the project proponents to minimize or eliminate the threats at the time facilities are constructed.

#### 4.11.1.1 Alternative A - Proposed Action

Under the Proposed Action, the proposed project would directly affect at least 16,129 acres in the MBPA. Given the average site density of six sites per square mile, approximately 150 sites potentially could be located in proposed new disturbance areas. Construction of well pads, reserve pits, access roads, pipelines, compressor stations, the central gas processing plant, water treatment and injection facilities, GOSPs, pump stations, and well drilling, as well as operation and maintenance activities, could directly affect cultural resources and contribute to an alteration of the overall setting and feeling of the MBPA.

Such changes in the MBPA could result in the adverse effects as outlined above in **Section 4.11.1**. An adverse effect is found when an undertaking may alter (directly or indirectly) any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association (36 CFR 800.5[a][1]).

Adverse effects include:

- Physical destruction of or damage to all or part of the property
- Alteration or removal of a property from its historic location
- Change in the character of the property's use or the physical features within the property's setting
- Introduction of visible, audible, or atmospheric elements out of character with the significant historic features of the property
- Neglect leading to deterioration or vandalism
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance (36 CFR 800.5[a][2)

The above-mentioned effects are unlikely to be adverse because of implementation of the ACEPMs identified in **Section 2.2.12.8** of this EIS and compliance with Section 106 of the NHPA. Dust control ACEPMs outlined in **Section 2.2.12.1** would also be implemented to reduce indirect effects to cultural resources.

#### 4.11.1.2 Alternative B - No Action Alternative

Under the No Action Alternative, the proposed project could directly affect at least 870 acres in the MBPA as a result of other oil well development projects. Given the average site density of six sites per square mile, approximately eight potential sites could be located in proposed new disturbance areas. Surface-disturbing activities including construction of well pads, access roads, pipelines, and central facilities could directly affect cultural resources. Above-ground facilities, secondary surface activities, and operation and maintenance activities could indirectly affect cultural resources and contribute to an alteration of the overall setting and feeling of the MBPA.

The direct and indirect effects of the No Action Alternative would be similar to those outlined under the Proposed Action but their extent would be reduced. Fewer acres would be affected, field-wide

electrification would not be developed, and reduced numbers of well pads, wells, access roads, pipelines, and facilities would be required.

#### 4.11.1.3 Alternative C - Field-Wide Electrification

Under Alternative C, direct and indirect effects due to surface disturbance would be similar to those described under the Proposed Action. However, developments under Alternative C would directly affect approximately 16,308 acres, which include 55 additional acres for 11 new substations and 124 acres for the installation of the proposed transmission lines. This initial surface disturbance would be nearly identical to that of the Proposed Action, except that Alternative C would have an additional 179 acres of total surface disturbance due to the installation of transmission lines and substations. Given the average site density of six sites per square mile, approximately 153 potential sites could be located in proposed new disturbance areas under Alternative C.

As outlined in the Proposed Action, adverse effects are unlikely because of implementation of the ACEPMs identified in **Section 2.2.12.8** of this EIS and compliance with Section 106 of the NHPA. Dust control ACEPMs outlined in **Section 2.2.12.1** would also be implemented to reduce indirect effects to cultural resources.

#### 4.11.1.4 Alternative D – Resource Protection Alternative

Development of the well pads, access roads, pipelines, and central facilities would result in approximately 9,805 acres of surface disturbance, which is 6,324 fewer acres than what is included in the Proposed Action. Given the average site density of six sites per square mile, approximately 60 potential sites could be located in proposed new disturbance areas.

Under Alternative D, direct and indirect effects due to surface disturbance would be similar to those described under the Proposed Action. However, under Alternative D, the extent of direct and indirect effects would be reduced and are unlikely to be adverse.

### 4.11.2 Section 106 Consultation

See **Section 6.2.3**.

### 4.11.3 Mitigation

No additional mitigation measures beyond the ACEPMs detailed in **Sections 2.2.12.1** and **2.2.12.8** are recommended for cultural resources.

### 4.11.4 Unavoidable Adverse Effects

For each alternative in this study, there is potential for unavoidable adverse impacts to cultural resources, despite compliance with Section 106 and ACEPMs. The greatest risk is the destruction of or impacts to unknown and undetected sites. As indicated in the previous sections, adherence to relevant cultural resource regulations would provide opportunities for mitigation of the majority of these impacts. Conducting the required cultural surveys prior to construction activities would also reduce this potential.

### 4.11.5 Irretrievable and Irreversible Commitments of Resources

The location and nature of all cultural resources in the study area is unknown. Therefore, it is not possible to determine if there would be irreversible and/or irretrievable impacts to cultural resources or what these impacts might be. All of the alternatives being considered have the potential for causing impacts. Following all relevant cultural resource regulations would provide opportunities to minimize the impacts and gather additional information regarding these resources. However, any physical impact to a cultural resource is essentially impossible to restore. Accordingly, there is some risk of irreversible impacts to cultural resources if these resources are unknown and are not detected during project implementation.

### 4.11.6 Relationship of Short-Term Uses to Long-Term Productivity

Proper mitigation and compliance with Section 106 would reduce but not eliminate impacts to long-term productivity of cultural resources due to short-term oil and gas development. Therefore, short-term oil and gas development would impact long-term productivity of cultural resources through the destruction of these resources during ground-disturbing activities.

## 4.12 LAND USE AND TRANSPORTATION

This section of the EIS describes the potential impacts of project development on land uses within the MBPA. It also describes the impacts the project would have on transportation, including impacts on traffic, the existing roadway system, and additional access roads. Impacts of project development on traffic accidents are also examined.

As mentioned in **Section 3.12**, the primary land uses within and adjacent to the MBPA include oil and gas development, livestock grazing, hunting, and dispersed recreation. Along the northern boundary of the MBPA, adjacent to Pariette Wash, lands have been developed for agricultural uses; however, there is minimal cultivated cropland outside of this area. No commercial buildings/facilities or private residences currently exist within the MBPA, and there are no residential communities present.

**Table 4.12-1** summarizes the initial surface disturbance to surface land owners by each alternative (see **Table 1.1-1** for a summary of land ownership). **Table 4.12-2** shows the amount of initial surface disturbance to surface owners that would occur as a result of construction of new access roads for each alternative.

**Table 4.12-1. Surface Disturbance within the MBPA by Surface Owner and Alternative**

| Surface Owner | Surface Acres | Initial Surface Disturbance (acres) | | | |
|---|---|---|---|---|---|
| | | Alt. A – Proposed Action | Alt. B – No Action | Alt. C – Field-wide Electrification | Alt. D – Resource Protection |
| BLM | 103,891 | 13,767 | 82 | 13,915 | 8,623 |
| State of Utah | 12,878 | 1,886 | 648 | 1,899 | 914 |
| Private | 2,974 | 476 | 140 | 494 | 268 |
| **Totals** | **119,743** | **16,129** | **870** | **16,308** | **9,805** |

**Table 4.12-2. Miles of New Access Road and Surface Disturbance within the MBPA by Surface Owner and Alternative**

| Surface Owner | Alt. A – Proposed Action | | Alt. B – No Action | | Alt. C – Field-wide Elec. | | Alt. D – Resource Protection | |
|---|---|---|---|---|---|---|---|---|
| | Miles of New Access Road | Initial Surface Dist. (acres) | Miles of New Access Road | Initial Surface Dist. (acres) | Miles of New Access Road | Initial Surface Dist. (acres) | Miles of New Access Road | Initial Surface Dist. (acres) |
| BLM | 208 | 1,008 | -- | -- | 208 | 1,008 | 73 | 354 |
| State of Utah | 31 | 150 | 21 | 102 | 31 | 150 | -- | -- |
| Private | 4 | 19 | 2.5 | 12 | 4 | 19 | -- | -- |
| **Totals** | **243** | **1,178** | **23.5** | **114** | **243** | **1,178** | **73** | **354** |

## 4.12.1 Direct and Indirect Effects

### 4.12.1.1 Alternative A - Proposed Action

#### 4.12.1.1.1 Land Use

Under the Proposed Action, construction of up to 5,750 wells and associated well pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 16,129 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 7,808 acres (see **Table 2.3-1**). Approximately 85 percent of the proposed initial surface disturbance would occur on BLM-administered Federal lands. Of the remaining initial disturbance area, approximately 12 percent would occur on State lands and about 3 percent would occur on private lands. No Indian trust lands would be disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under the Proposed Action would increase the levels of construction, drilling, completion, and production activities already occurring in the MBPA and would contribute to the general semi-industrial setting. Construction of additional pipelines and increased traffic on roads co-located with pipelines may potentially impact the integrity of existing ROWs within the MBPA. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, because nearly all existing ROWs in the MBPA are used for ongoing well field operations and all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. Potential conflicts with existing ROWs could be resolved on a site-specific basis, including the use of applicable Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b). Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate.

Potential impacts to other land uses under the Proposed Action would include:

- Increased access to the MBPA due to new road construction, elevated industrial traffic, and potential increases in traffic-related conflicts between industry and recreational users (see **Section 4.13**, *Recreation*);

- Loss of livestock forage and potential impacts to grazing activities (see **Section 4.8**, *Range Resources*);
- Loss of wildlife habitat and displacement of wildlife due to surface disturbance, habitat fragmentation, and increased human presence due to infill development activity (see **Section 4.9**, *Fish and Wildlife*); and
- Changes in recreational opportunity (e.g., increased access for OHV users, decreased opportunity for primitive recreation). See **Section 4.13**, *Recreation*.

#### 4.12.1.1.2 Transportation

Under the Proposed Action, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 363 miles of roads already in place to service existing facilities, an estimated 243 miles of new roads would be necessary to access the new wells that would be developed under the Proposed Action.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day for the Proposed Action would be 25 heavy truck trips and 10 light truck trips per well during well drilling and completion (BLM 2010). This would result in an additional traffic volume of approximately 35 total trips per day per well during peak well completion.

Vehicle trips also would be generated during well production, routine well maintenance, and periodic well stimulation and removal of produced water. The average number of trips per well during well production would be 111 annually, or approximately 0.30 per day (Felzburg et al. 2012). Therefore, the Proposed Action would generate approximately 1,725 trips per day upon completion of well development. However, it should be noted that this calculation assumes one well per well pad. As mentioned in **Chapter 2.0**, *Proposed Action and Alternatives*, multiple wells may be located on one well pad, which would reduce the actual number of trips. In addition, most of these trips would be made by relatively few vehicles, so actual traffic volumes on the roads would not be as great as the number of trips. **Table 4.12.1.1.2-1** shows the number of vehicle trips and miles traveled per day that would be generated under each alternative.

**Table 4.12.1.1.2-1. Estimated Vehicle Trips and Miles Traveled within the MBPA by Alternative**

| | Alt. A – Proposed Action | Alt. B – No Action | Alt. C – Field-wide Electrification | Alt. D – Resource Protection |
|---|---|---|---|---|
| Vehicle Trips per Day - Construction | 35 | 35 | 35 | 35 |
| Vehicle Trips per Day - Well Operations | 1,725 | 233 | 1,725 | 1,517 |
| Vehicle Miles Traveled per Day – Well Operations | 29,900 | 4,046 | 29,900 | 26,302 |

Although the exact volume is unknown, it is expected that much of the anticipated traffic generated under the Proposed Action would use U.S. 40/U.S. 191 between Roosevelt and Vernal, as this is the main highway in the vicinity of the MBPA. As discussed in **Section 3.12.2.1**, much of the traffic on these roads consists of oil tanker trucks that visit producing wells in the MBPA each day.

Neither the UDOT nor the County Roads Departments has specific information on the capacity of maintained gravel roads in the MBPA. However, UDOT was able to verbally confirm that a 28-foot-wide, paved, two-lane rural county road with no turn lanes would have a Level of Service rating of A and a corresponding capacity of up to 6,000 vehicles per day (BLM 2010). UDOT assumed that the capacity range for a maintained gravel road would be less than a paved, two-lane rural county road, but was not able to cite a specific capacity range. As noted above, the projected maximum daily increase in trips per day for the Proposed Action would be 25 heavy truck trips and 10 light truck trips per well during well drilling and completion and an average of 0.30 trips per day during well production. Therefore, a paved, two-lane rural county road would likely accommodate traffic generated by the Proposed Action. Since no capacity range has been provided, it is not known if a maintained gravel road would accommodate this traffic.
During well field operation, it is estimated there would be a total of 2.4 vehicle miles of light truck traffic per well per day and 2.8 vehicle miles of heavy truck traffic per well per day. Vehicle miles driven per well per day were calculated based on well pad spacing, barrels of produced water, capacity of water trucks, and miles associated with well servicing. The light truck traffic would include pumpers (maintenance workers) and workover crews, while heavy truck traffic would consist of water trucks hauling produced water from each well (BLM 2010). The total amount of vehicle miles traveled during well operations under the Proposed Action would be 5.2 vehicle miles per well multiplied by the number of wells, or approximately 29,900 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Information contained in the Draft EIS for the Greater Natural Buttes Project reported there were three spills (two minor) in 1 year that occurred in conjunction with servicing existing wells. The resulting accident probability rate is 1.6 percent per well, or 0.02 accidents for each well serviced (BLM 2010). Based on this estimate, the Proposed Action could result in as many as 115 accidents annually, once all of the wells have been drilled and are in operation. The majority of these accidents would be minor.

Newfield would implement development consistent with ACEPMs detailed in **Section 2.2.12**. To minimize impacts, Newfield would attempt to use the existing road network to the extent practical. Furthermore, the use of telemetry to monitor wells would reduce the frequency of well visits, thereby reducing the amount of potential vehicle traffic within the MBPA.

### 4.12.1.2 Alternative B - No Action

#### 4.12.1.2.1 Land Use

Under Alternative B, construction of up to 788 wells and pads, associated access roads, pipelines, and facilities would result in the initial disturbance of approximately 870 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 659 acres (see **Table 2.4-1**). Approximately 9 percent of the proposed initial surface disturbance would occur on BLM-administered federal lands. Of the remaining initial disturbance area, approximately 12 percent would occur on state lands and about 16 percent would occur on private lands (see **Table 4.12-1**). No Indian trust lands would be disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under the No Action Alternative would increase the levels of construction, drilling, completion, and production activities already occurring in the MBPA, although the level of development would be significantly less than what would be expected under the Proposed Action. Construction of additional pipelines and increased traffic on roads co-located with pipelines may potentially impact the integrity of existing ROWs within the MBPA. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, this impact would be less than what would occur under the Proposed Action. Also, because nearly all existing ROWs in the MBPA are used for ongoing well field operations, and all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. As with the Proposed Action, any potential conflicts with existing ROWs could be resolved on a site-specific basis. Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate.

Potential impacts to other land uses under Alternative B would be similar to those identified for the Proposed Action (see **Section 4.12.1.1.1**); however, these impacts would be less because fewer wells would be developed.

#### 4.12.1.2.2 Transportation

Under Alternative B, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 36 miles of roads already in place to service existing facilities, an estimated 23 miles of new roads would be necessary to access the new wells developed under this alternative.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day under Alternative B would be the same as what would take place under the Proposed Action (i.e., approximately 35 total trips per day per well during peak well completion). When this number is added to the existing traffic counts, the resulting new potential average daily traffic count still falls within the likely capacity for maintained paved roads within and outside the MBPA.

Based on the factors discussed in **Section 4.12.1.1.2**, the No Action Alternative would generate approximately 233 trips per day upon completion of well development. However, as with the Proposed Action, this calculation assumes one well per well pad, and most of these trips would be made by relatively few vehicles. Impacts on U.S. 40/U.S. 191 would be similar to those under the Proposed Action, but would be less due to lower traffic volume. As noted in the Proposed Action discussion, UDOT indicated that a paved, two-lane rural county road would likely accommodate traffic that would be generated as a result of the No Action Alternative. It is not known if a maintained gravel road could handle additional vehicle trips, but given the smaller volume than the Proposed Action, such roads would be likely to accommodate traffic under this alternative. The total amount of vehicle miles traveled during well operations under the No Action Alternative would be 5.2 vehicle miles per well multiplied by the number of wells, or approximately 4,046 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Based on information provided in **Section 4.12.1.1.2**, Alternative B could result in as many as 16 accidents annually, once all of the wells have been drilled and are in operation. The majority of these accidents would be minor.

Newfield would implement development consistent with ACEPMs detailed in **Section 2.2.12** and the Reclamation Plan (**Appendix G**). Newfield would also implement additional actions to minimize transportation impacts (see **Section 4.12.1.1.2**).

### 4.12.1.3 Alternative C - Field-wide Electrification

#### 4.12.1.3.1 Land Use

Under Alternative C, construction of up to 5,750 wells and associated pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 16,308 acres. This initial surface disturbance is nearly identical to that of the Proposed Action, except that Alternative C would have an additional 179 acres of total surface disturbance due to the installation of transmission lines and substations. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 7,925 acres (see **Table 2.5-1**). Approximately 85 percent of the proposed initial surface disturbance would occur on BLM-administered federal lands. Of the remaining initial disturbance area, approximately 12 percent would occur on state lands and about 3 percent would occur on private lands (see **Table 4.12-1**). No Indian trust lands would be disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under Alternative C would have similar impacts to the Proposed Action in terms of increased activities in the MBPA and contribution to the general semi-industrial setting. Construction of additional pipelines and increased traffic on roads co-located with pipelines also would have similar impacts to the Proposed Action. However, because nearly all existing ROWs in the MBPA would be used for ongoing well field operations, and all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, because nearly all existing ROWs in the MBPA are used for ongoing well field operations, and all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. As with the Proposed Action, any potential conflicts with existing ROWs could be resolved on a site-specific basis. Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate. Potential impacts to other land uses under Alternative C would be similar to those identified for the Proposed Action (see **Section 4.12.1.1.1**).

#### 4.12.1.3.2 Transportation

Under Alternative C, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 363 miles of roads already in place to service existing facilities, an estimated 243 miles of new roads would be necessary to access the new wells developed under this alternative.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day for the Alternative C would be the same as what would be expected under the Proposed Action (i.e., approximately 35 total trips per day per well during peak well completion). When this number is added to the existing traffic counts, the resulting new potential average daily traffic count still falls within the likely capacity for maintained paved roads within and outside the MBPA.

Based on the factors discussed in **Section 4.12.1.1.2**, Alternative C would generate approximately 1,725 trips per day upon completion of well development–the same number as the Proposed Action. This calculation assumes one well per well pad, and most of these trips would be made by relatively few vehicles. Impacts on U.S. 40/U.S. 191 would be the same as those under the Proposed Action. As noted in the Proposed Action discussion, UDOT indicated that a paved, two-lane rural county road would likely accommodate traffic that would be generated as a result of Alternative C. It is not known if a maintained gravel road could handle additional vehicle trips under this alternative. The total amount of vehicle miles traveled during well operations under Alternative C would be the same as the Proposed Action, or approximately 29,900 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Based on information provided in **Section 4.12.1.1.2**, Alternative C could result in as many as 115 accidents annually–the same number as the Proposed Action. The majority of these accidents would be minor.

Newfield would implement development consistent with ACEPMs detailed in **Section 2.2.12** and the Reclamation Plan (**Appendix G**). Newfield would also implement additional actions to minimize transportation impacts (see **Section 4.12.1.1.2**).

### 4.12.1.4 Alternative D - Resource Protection

#### 4.12.1.4.1 Land Use

Under Alternative D, construction of up to 5,058 wells and associated pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 9,805 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 2,818 acres (see **Table 2.6-1**). Approximately 86 percent of the proposed initial surface disturbance would occur on BLM-administered Federal lands. Of the remaining initial disturbance, approximately 11 percent would occur on State lands, and about 3 percent would occur on private lands (see **Table 4.12-1**). No Indian trust lands would be disturbed.

As described in **Section 3.12**, oil and natural gas exploration and development is a primary land use within the MBPA. Infill development under Alternative D would have similar impacts to the Proposed Action in terms of increased activities in the MBPA and contribution to the general semi-industrial setting. Construction of additional pipelines and increased traffic on roads co-located with pipelines may potentially impact the integrity of existing ROWs within the MBPA. In addition, increased traffic would increase the risk of vehicle accidents that could result in damage or rupture to surface pipelines adjacent to roads. However, because nearly all existing ROWs in the MBPA are used for ongoing well field operations, and all proposed pipelines would be buried, minimal adverse impacts to existing ROWs would occur. As with the Proposed Action, any potential conflicts with existing ROWs could be resolved on a site-specific basis. Mitigation measures addressing potential impacts to transportation, range resources, fish and wildlife, and recreation are detailed in their respective sections of **Chapter 4.0**, as appropriate. Potential impacts to other land uses under Alternative D would be similar to those identified for the Proposed Action (see **Section 4.12.1.1.1**).

#### 4.12.1.4.2 Transportation

Under Alternative D, new roads would be constructed as needed to provide access to the proposed new wells. In addition to the approximately 331 miles of roads already in place to service existing facilities, an

estimated 73 miles of new roads would be necessary to access the new wells developed under this alternative.

Transportation resources would be impacted through additional vehicle trip generation. These would be greatest during the well drilling and completion phases of the project. The projected maximum daily increase in trips per day for Alternative D would be the same as the Proposed Action (i.e., approximately 35 total trips per day per well during peak well completion). When this number is added to the existing traffic counts, the resulting new potential average daily traffic count still falls within the likely capacity for maintained paved roads within and outside the MBPA.

Based on the factors discussed in **Section 4.12.1.1.2**, Alternative D would generate approximately 1,517 trips per day upon completion of well development. This calculation assumes one well per well pad, and most of these trips would be made by relatively few vehicles. Impacts on U.S. 40/U.S. 191 would be similar to those under the Proposed Action, but would be less due to slightly lower traffic volume. As noted in the Proposed Action discussion, UDOT indicated that a paved, two-lane rural county road would likely accommodate traffic that would be generated as a result of Alternative D. It is not known if a maintained gravel road could handle additional vehicle trips under this alternative. The total amount of vehicle miles traveled during well operations under Alternative D would be 5.2 vehicle miles per well multiplied by the number of wells, or approximately 26,302 total vehicle miles per day.

An increase in traffic within the MBPA and the surrounding transportation network would be evident during the LOP. Based on information provided in **Section 4.12.1.1.2**, Alternative D could result in as many as 101 accidents annually, once all of the wells have been drilled and are in operation. The majority of these accidents would be minor.

Newfield would implement development consistent with ACEPMs detailed in **Section 2.2.12** and the Reclamation Plan (**Appendix G**). Newfield would also implement additional actions to minimize transportation impacts (see **Section 4.12.1.1.2**).

## 4.12.2 Mitigation

### 4.12.2.1 Transportation Mitigation

The following proposed mitigation measures could be applied to reduce impacts to transportation-related activities:

1) Newfield employees and contractors would comply with posted speed limits while driving roads within the MBPA and would adhere to speed limits outside the MBPA.
2) Additional permanent and temporary signage would be placed along roadsides to alert motorists of upcoming construction vehicles to lower the probability of accidents.
3) Newfield would coordinate with the appropriate AO when constructing, maintaining, or reclaiming roads.
4) Cooperative road management plans would be developed among Newfield, Duchesne County, Uintah County, the State of Utah, and private landowners to address maintenance requirements and responsibilities, and to ensure that roads used by project vehicles are not degraded.

5) Whenever practicable, heavy and/or slow-moving equipment would be moved at night or during non-peak driving times to minimize delays to other users. Flaggers and/or flag cars would be used to alert non-project traffic to upcoming project equipment.
6) Gas and water pipelines would be buried at road crossings. Newfield would bury all pipelines crossing County roads to a minimum depth of 5 feet to ensure the safety of road maintenance workers and activities.
7) Signs would be installed in areas of heavy equipment and truck traffic to warn other users.
8) Passing areas would be constructed as directed by the AO so other users can safely pass project-related vehicles.
9) Newfield would use centralized tank locations for water and condensate tanks to reduce vehicle trips whenever possible. The feasibility of centralizing tank facilities would be determined on a site-specific basis.
10) All applicable Fluid Minerals BMPs from Appendix R of the Vernal RMP (BLM 2008b) would be implemented.

### 4.12.3 Unavoidable Adverse Impacts

There are no unavoidable adverse impacts related to land use.

Increased vehicular traffic would increase local traffic volumes, elevate the risk of traffic accidents, add to the local requirements for road maintenance, and cause occasional delays for non-project users. Although the risk of traffic accidents, delays, and the need for increased road maintenance could be mitigated, there would still be some residual impacts. This would occur under all of the alternatives to varying degrees, depending on the number of miles of new access road and estimated vehicle trips during construction and operations.

### 4.12.4 Irretrievable and Irreversible Commitments of Resources

Surface disturbance generated by the project would remain in that state until rehabilitated (approximately 30 years after drilling), as described elsewhere in this chapter. Any traffic accidents caused by project-related activities would be irreversible.

### 4.12.5 Relationship of Short-Term Uses to Long-Term Productivity

This project is unlikely to impact long-term land use, land ownership, or land management. Many of the aboveground facilities, such as drill rigs and water tanks, eventually would be removed at the end of their relatively short-term life spans, and the land would be reclaimed to natural conditions. The reclamation of arid desert lands can take several decades, but reclamation would reduce the long-term impacts to public land resources.

The increased road network required for the project would lead to increased access over the LOP, or until project roads were decommissioned. Although increased traffic volume from drilling and construction would occur, it would be a short-term and localized. Traffic volume increases during production would be less than during the combined well drilling and production phase, but would persist for the LOP.

## 4.13 RECREATION

The potential effects of the construction and operation of the Proposed Action on recreational resources are determined based on an analysis of how many recreational opportunities would be lost versus how many would be created. Direct impacts to recreation would occur if acreage that is currently available for recreation were used for well exploration and development, or if additional recreational opportunities are created by an expanded road network and project-related surface disturbances.

The facilities and structures proposed under the Proposed Action and the other alternatives would likely impact recreational opportunities by directly disrupting current activities such as hunting, OHV use where allowed, wetlands recreation, and hiking. Additionally, impacts to river recreationists would include visual and noise impacts associated with drilling a water well in or drilling oil and gas wells near the Green River floodplain. Specific impacts are discussed below in the analysis of river recreation. Construction and operation of proposed facilities could also create a visual intrusion on the recreational experience (e.g., enjoyment and appreciation) sought by recreationists who value unobstructed viewsheds and relatively natural settings for their activities (BLM 2005b, BLM 2006a).

Potential direct impacts associated with the Proposed Action would include artificial light and related light pollution (e.g., sky glow) from night lighting required for night-time drilling. Night lighting would degrade scenic quality by contributing to the intrusive artificial lighting of oil and gas operations. This would be of particular concern in the Green River areas. Compliance with the provisions from the Gold Book described in the previous paragraph would reduce potential adverse impacts from lighting at well drilling sites.

The types of direct and indirect effects on recreation resources would be the same under all alternatives because they would use the same well drilling and production methods. However, project-related impacts would vary in degree, based on the number of wells and associated roads, pipelines, and other proposed facilities.

As described in **Section 3.13.1**, the BLM manages recreational use of public lands through two different basic units of recreation management: the SRMA and the ERMA. No SRMAs exist within the MBPA, so no impacts would occur. The public lands within the MBPA are managed as an ERMA, wherein recreation activities are subject to few restrictions and are managed at the opportunity level, rather than for specific activities and experiences. **Table 4.13-1** compares the acres that would be disturbed by each alternative.

**Table 4.13-1. Long-Term Disturbance from Well Pads and New Roads by Alternative**

| | Alternative A – Proposed Action | Alternative B – No Action | Alternative C – Field-wide Electrification | Alternative D – Resource Protection |
|---|---|---|---|---|
| Acres of Disturbance from Well Pads | 7,808 | 659 | 7,925 | 2,818 |
| Miles of New Roads | 243 | 23 | 243 | 73 |

## 4.13.1 Direct and Indirect Effects

### 4.13.1.1 Alternative A - Proposed Action

#### 4.13.1.1.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of the Proposed Action would occur from project-related construction, operation, and maintenance activities. These development activities would result in additional disruption to recreation as a result of increased noise (e.g., increased volumes from construction, drilling, and production equipment, changes in ambient tones or tonal noises, and repetitive low frequency noise emanating from production equipment such as compressor stations), dust, traffic, visual intrusions, and increased industrial presence. See **Sections 4.12 and 4.14** regarding impacts to access and visual resources, respectively. It is likely that recreational travel through the well field will increase over time. In addition, development of new project-related roads would result in increased access for, and a wider distribution of, OHV usage.

The Proposed Action would add to hundreds of existing oil wells with associated pump jacks that are located within viewing distance of recreational users driving these roads. Previously authorized oil and gas operations have added an industrial component to the landscape throughout the majority of the MBPA, and the Proposed Action would add to this type of landscape.

The Proposed Action would potentially create more opportunities for OHV recreation with 243 more miles of project-related access roads. Construction of access roads would increase opportunities for motorized forms of recreation such as backcountry driving and sightseeing. Existing well field development has not restricted public access for dispersed recreation along Pariette Road leading to Pariette Wetlands, Sand Wash Road leading to Green River recreation access, or Wells Draw Road leading to recreational opportunities throughout the well field. Energy development has made revenue available to Uintah and Duchesne Counties enabling them to improve the Pariette and Wells Draw roads, which has greatly increased the accessibility and safety of travel to recreational opportunities in the area. The Proposed Action would further provide revenue to the counties, which could be used to improve the accessibility to recreation areas.

#### 4.13.1.1.2 Long-Term Recreational Impacts

Under the Proposed Action, the potential long-term adverse effects on recreation would include a decrease in some recreational opportunities due to the direct conversion of 7,808 acres of land to well-drilling facilities. The potential long-term beneficial effects on recreation under the Proposed Action would include increased recreational opportunities through access to previously inaccessible areas due to 243 miles of new roads. New access would provide benefits to some types of recreationists; specifically, motorized and mechanized users would receive the greatest benefits.

***River Recreation***

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. **Section 4.15.1.1.1** discusses potential impacts to the area within the Lower Green River ACEC and the suitable WSR segment.

Project-related construction, operation, and maintenance activities would occur more than 9 miles north of the Sand Wash put-in, which provides the main access point to the Green River in the vicinity. As no

wells would be drilled within 9 miles of the Sand Wash put-in, no impacts are expected for this resource. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would not affect as many visitors because recreational use is lower on that WSR segment.

Development would not be visible to river recreationists within the Green River due to obstruction of line of sight between and well development. As presented in Section 3.1 General Setting, the elevation within the MBPA varies up to approximately 2,236 feet. A steep topographic gradient (several hundred feet in places) is frequently present between the surface water level of the Green River and the surrounding upland landforms. The presence of vegetation, both on stream banks as well as upland areas, further obstructs the recreationist's view. For these reasons, the well development located nearest to the river corridor would be most visible to recreationists, while that development furthest from the river corridor would be least visible. Construction of the proposed water collector well would not have limited impacts on recreational users as the well would be drilled in the fall or winter, during a period of low recreational use. Once completed, the water collector well would not be visible from the river. In addition, ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River by using low-profile tanks at all well pads located within one-half mile or line of sight of the Green River, whichever is less.

***Hunting***

Big-game hunters may receive a direct benefit from well development in the MBPA from the 243 miles of new roads that would be created under the Proposed Action (see **Table 4.13-1**). The expanded road network may increase access to hunting grounds within the MBPA. However, this direct benefit may only be experienced by a small percentage of hunters and could be outweighed by the long-term direct and indirect adverse effects of habitat reduction, lower forage productivity, noise, and persistent human presence.

Well development in the MBPA would have long-term indirect adverse effects related to elk, deer, and pronghorn populations and behavior. **Section 4.9.1.1** contains a more detailed discussion of the impacts of well development on elk, deer, and other wildlife species. Roads have been shown to reduce habitat value for elk and deer, thereby decreasing the likelihood of hunters finding elk and deer in areas with new roads. Habitat conversion and fragmentation due to the construction of wells would also indirectly impact big-game hunting because the elk and deer would have fewer resources for cover, forage, and breeding grounds. Constructing a network of new roads would also result in noise and a persistent human presence, which would negatively affect wildlife populations and use of the area. Increased road mileage would detract from the experience of hunters who value hunting in a natural setting removed from motorized sights and sounds.

Small-game hunting also occurs across the MBPA. Small-game hunters would experience similar impacts from well development as big-game hunters, including loss of cover and breeding areas for game species, as well as loss of hunting grounds due to the direct conversion of vegetated land to gas wells and roads. While some small-game species such as sage-grouse are likely to avoid developed areas, others such as cottontail are frequently found around well facilities (BLM 2006d). Consequently, the impacts of project construction to small-game hunters are likely to depend on which species is being hunted. The construction of additional roads throughout small-game hunting habitats would increase access for hunters, potentially increasing their success rates depending on the species hunted.

Direct impacts to waterfowl hunting could result from increased levels of human activity and noise in close proximity to potential waterfowl habitat. Increased noise levels and visual obstructions from

construction and drilling activities would be localized and short-term; therefore, indirect impacts to waterfowl hunters would likely be temporary in nature and would not likely alter the use of specific waterfowl hunting areas or productivity of current waterfowl populations. Direct impacts to waterfowl hunters are expected to be minor as very little disturbance to wetland habitats are expected to occur under the Proposed Action and because of the conservation measures listed in **Section 4.10.2**.

The Proposed Action may provide a limited beneficial impact from increased access to hunting areas as a result of additional access road construction. However, there would be adverse, long-term impacts from the Proposed Action from habitat fragmentation and habitat conversion due to the number of acres impacted by well pad and access road construction.

***OHV Recreation***

Well development in the MBPA would result in direct long-term adverse impacts to OHV users through the alteration of developed lands. Areas that are currently designated as Limited Use would be altered by the construction of well pads and pipelines. OHV use within the MBPA would be limited to existing roads and trails. Approximately 6,454 acres of land within the MBPA designated as Limited Use would be converted to project facilities in the long term. However, ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on OHV travel.

OHV users would gain direct, long-term beneficial recreational opportunities with the addition of 243 miles of access roads within areas designated as Limited Use.

***Wetlands Recreation***

If the Proposed Action were implemented, up to approximately 1,209 acres of recreation would be initially disturbed in the Pariette Wetlands ACEC. Approximately 439 acres within the ACEC would be disturbed and potentially altered for recreation due to well development in the long term (see **Section 4.15.1.1.1**). No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. In addition to surface disturbance, wells in this area could adversely and indirectly impact visitor recreational satisfaction by disturbing waterfowl.

***Hiking***

As noted in **Section 3.13.2.6**, few people use the MBPA for hiking because there are relatively few attractions for hikers. As such, there would be relatively minor adverse impacts to this recreation user group from well development. As noted in the Wetlands Recreation subsection above, no disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. The BLM is proposing to improve the existing trail system at the Pariette Wetlands ACEC by constructing a connecting trail between the parking lot and existing trails and elevated walkways to create a loop trail. Since disturbance to the existing trail and parking lot is not anticipated, the Proposed Action is not anticipated to disturb the proposed improvements. ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

### 4.13.1.2 Alternative B - No Action

#### 4.13.1.2.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of Alternative B would occur from project-related construction, operation, and maintenance activities. The impacts of these development activities would be similar to those discussed under the Proposed Action, although they would be less extensive due to the fewer number of wells that would be drilled and operated. It is likely that recreational travel through the well field would increase over time. In addition, development of new project-related roads would result in increased access for, and a wider distribution of, OHV usage. However, due to less development occurring under Alternative B, the extent of these impacts would be less than what would occur under the Proposed Action.

Alternative B would add to hundreds of existing oil wells with associated pump jacks that are located within viewing distance of recreational users driving these roads. Compared to the other alternatives, the No Action Alternative would have fewer potentially adverse impacts on recreational opportunities because fewer wells would be developed and fewer acres would be impacted by well pad construction. Nevertheless, Alternative B would add to the industrial component of the landscape contributed as a result of previously authorized oil and gas operations.

Like the Proposed Action, Alternative B would potentially create more opportunities for OHV recreation and other motorized forms of recreation with 23 more miles of project-related access roads. These opportunities would be less extensive than under the Proposed Action or other alternatives, due to the smaller number of miles of new roads. Alternative B would not restrict public access to dispersed recreation along Pariette Road, Sand Wash Road, or Wells Draw Road.

#### 4.13.1.2.1 Long-Term Recreational Impacts

Under Alternative B, the potential long-term adverse effects on recreation would include a decrease in recreational opportunities due to the direct conversion of 659 acres of land to well-drilling facilities (see **Table 4.13-1)**. The potential long-term beneficial effects would include increased recreational opportunities through access to previously inaccessible areas due to 23 miles of new roads. As with the Proposed Action, new access would provide benefits to some types of recreationists, particularly motorized and mechanized users.

***River Recreation***

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. **Section 4.15.1.2.1** discusses potential impacts to the area within the Lower Green River ACEC and the proposed WSR segment. As with the Proposed Action, the No Action Alternative would drill no wells within approximately 9 miles of the Sand Wash put-in, so visual impacts at this entry to the Green River would be minor. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would be similar to those discussed under the Proposed Action.

Only a small portion of the MBPA, just south of the confluence with Pariette Wash, would be adjacent to the Green River. Under the No Action Alternative, there would be no surface disturbance within one mile of the river. River recreation users on this segment would quickly move away from any sights and sounds of development. Given the lower number of wells that would be drilled under the No Action Alternative,

few if any wells would be drilled in the vicinity of the Green River. In addition, ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River.

***Hunting***

Under Alternative B, big-game hunters (elk, mule deer, and pronghorn antelope) and small-game hunters may receive a direct benefit from more roads, but also experience adverse effects similar to those described under the Proposed Action. Compared to the other alternatives, Alternative B would have less of a beneficial impact from increased access to hunting areas, because fewer new roads would be constructed. Impacts to waterfowl hunting would be less than those described under the Proposed Action as less surface disturbance would occur within or around wetland areas. However, there would be fewer adverse long-term impacts from increased habitat fragmentation and habitat conversion under Alternative B because fewer acres would be impacted by well pad and access road construction.

***OHV Recreation***

Well development under Alternative B would result in similar long-term adverse impacts to, and create similar long-term beneficial recreational opportunities for, OHV users as under the Proposed Action. However, the amount of Limited Use land converted to developed uses would be less under this alternative; therefore, less acreage currently available to OHV users would be lost. OHV use within the MBPA would be limited to existing roads and trails. Approximately 74 acres of land within the MBPA designated as Limited Use would be converted to project facilities in the long term. ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on OHV travel. Any new well activity in areas currently designated as closed to OHV use would not impact OHV users.

***Wetlands Recreation***

If Alternative B were implemented, up to approximately 62 acres of recreation would be initially disturbed in the Pariette Wetlands ACEC. Under Alternative B, approximately 45 acres within the ACEC would be disturbed and potentially unavailable for recreation due to well development in the long term (see **Section 4.15.1.2.1**). No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. In addition to surface disturbance, wells in this area could adversely and indirectly impact visitor recreational satisfaction by disturbing waterfowl. Compared to the Proposed Action, the No Action Alternative would have fewer long-term adverse impacts to wetlands recreation because less wetland/riparian area would be disturbed.

***Hiking***

As noted in **Section 3.13.1**, few people use the MBPA for hiking because there are relatively few attractions for hikers. As such, there would be relatively minor adverse impacts to this recreation user group from well development. Under Alternative B, there would be fewer impacts related to hiking than under the other alternatives. No disturbance to the existing trail or parking lot of the Pariette Wetlands ACEC, or to proposed improvements, is anticipated. As noted in the Proposed Action section, ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

### 4.13.1.3 Alternative C – Field-wide Electrification

#### 4.13.1.3.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of Alternative C would occur from project-related construction, operation, and maintenance activities. These impacts would be similar in scope and magnitude to those discussed under the Proposed Action because the number of wells drilled under Alternative C would be the same. Furthermore, the potential to create opportunities for OHV and other motorized forms of recreation would also be identical under Alternative C because the same miles of new roads would be required. The primary difference in impacts to recreation under Alternative C when compared to the Proposed Action is the addition of field-wide electrification, which would result in additional visual impacts and intrusions in the MBPA and could further diminish the recreational experience for visitors to the MBPA.

#### 4.13.1.3.2 Long-Term Recreational Impacts

Under Alternative C, the potential long-term adverse effects on recreation would include a decrease in some recreational opportunities due to the direct conversion of 7,925 acres of land to well-drilling facilities (see **Table 4.13-1)**. The potential long-term beneficial effects on recreation would be similar to those under the Proposed Action, including increased recreational opportunities through access to previously inaccessible areas resulting from 243 miles of new roads.

***River Recreation***

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. **Section 4.15.1.3.1** discusses potential impacts to the area within the Lower Green River ACEC and the proposed WSR segment. As with the Proposed Action, Alternative C would drill no wells within approximately 9 miles of the Sand Wash put-in, so visual impacts at this entry to the Green River would be minor. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would be similar to those discussed under the Proposed Action. However, any overhead utility lines visible from the river would further diminish the river recreation experience as compared to the Proposed Action.

Only a small portion of the Project Area, just south of the confluence with Pariette Wash, would be adjacent to the Green River. Under Alternative C, the number of acres of surface disturbance within one mile of the river would be the same as what would be expected under the Proposed Action. Potential impacts would be the same as those described under the Proposed Action. ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River.

***Hunting***

Under Alternative C, big-game hunters (elk, mule deer, and pronghorn antelope), waterfowl hunters, and small-game hunters may receive the same direct benefit of road access, but also experience the same adverse effects as those described under the Proposed Action. Impacts to waterfowl hunting would be identical those described under the Proposed Action as a similar amount of surface disturbance would occur within or around wetland areas. Both the number of wells drilled and the 243 miles of new roads planned under Alternative C would be the same as discussed under the Proposed Action. The expanded road network may increase access to hunting grounds within the MBPA.

***OHV Recreation***

Well development under Alternative C would result in the same direct long-term adverse impacts to OHV users and the same long-term beneficial impacts on OHV recreational opportunities as those expected under the Proposed Action. OHV use within the MBPA would be limited to existing roads and trails. The ACEPMs detailed in Section 2.2.12 would reduce the impacts of buried pipelines for site-specific use on OHV travel.

***Wetlands Recreation***

If Alternative C were implemented, up to approximately 1,211 acres of recreation would be initially disturbed in the Pariette Wetlands ACEC. Under Alternative C, approximately 441 acres within the ACEC would be disturbed and potentially unavailable for recreation due to well development in the long term (see **Section 4.15.1.3.1**). No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. Compared to the Proposed Action, Alternative C would have similar long-term adverse impacts to wetlands recreation because about the same amount of wetland/riparian area would be would be disturbed. In addition, overhead utility lines visible to recreational users in the ACEC could diminish the experience of such visitors.

***Hiking***

As with the Proposed Action, Alternative C would have relatively minor adverse impacts of well development on this recreation user group. No disturbance to the existing trail or parking lot of the Pariette Wetlands ACEC, or to proposed improvements, is anticipated. However, overhead utility lines could diminish the experience of hikers. As noted in the Proposed Action section, ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

### 4.13.1.4 Alternative D - Resource Protection

#### 4.13.1.4.1 Short-Term Recreational Impacts

Short-term impacts to recreation within the MBPA as a result of Alternative D would occur from project-related construction, operation, and maintenance activities. These impacts would be similar to those discussed under the Proposed Action but would be less extensive because the number of acres that would be disturbed would be less under Alternative D. Furthermore, the potential to create opportunities for OHV and other motorized forms of recreation would also be similar to the Proposed Action, but would be less extensive because fewer miles of new roads would be required.

#### 4.13.1.4.2 Long-Term Recreational Impacts

Under Alternative D, the potential long-term adverse effects on recreation would include a decrease in recreational opportunities due to the direct conversion of 2,818 acres of land to well-drilling facilities (see **Table 4.13-1**). The potential long-term beneficial effects on recreation would include increased recreational opportunities through access to previously inaccessible areas resulting from 73 miles of new roads. The potential adverse effects and benefits under Alternative D would be similar to those discussed under the Proposed Action, but would be less extensive because fewer acres would be disturbed.

***River Recreation***

Impacts to river recreation would include visual impacts associated with wells within sight of the Green River. Under Alternative D, two proposed well pads with 160-acre spacing would be directionally drilled in ACEC, two proposed Green River well pads with 160-acre spacing would be expanded, and one existing well pad would be expanded and directionally drill in ACEC could be placed within 0.5 mile sight of the river. **Section 4.15.1.4.1** discusses potential impacts to the area within the Lower Green River ACEC and proposed WSR segment. As with the Proposed Action, Alternative D would drill no wells within approximately 9 miles of the Sand Wash put-in, so visual impacts at this entry to the Green River would be minor. Visual impacts experienced on the stretch of the Green River to north of the Sand Wash put-in would be similar to those discussed under the Proposed Action.

Only a small portion of the MBPA, just south of the confluence with Pariette Wash, would be adjacent to the Green River. Under Alternative D, there would be approximately 35 acres of surface disturbance within one mile of the river. Potential impacts would be the same as those described under the Proposed Action, but would be less extensive due to the smaller number of acres that would be disturbed. ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts to recreationists on the Green River.

***Hunting***

Under Alternative D, big-game hunters (elk, mule deer, and pronghorn antelope), waterfowl hunters, and small-game hunters may receive the same direct benefit of road access, but also experience adverse effects similar to those described under the Proposed Action. However, Alternative D would have less of a beneficial impact from increased access to hunting areas than the Proposed Action, because fewer new roads would be constructed. On the other hand, there would be fewer adverse long-term impacts from increased habitat fragmentation and habitat conversion under Alternative D because fewer acres would be impacted by well pad and access road construction. Impacts to waterfowl hunting would be less than those described under the Proposed Action as no surface disturbance would occur within or around wetland areas within the Pariette Wetlands ACEC.

***OHV Recreation***

Well development under Alternative D in the MBPA would result in similar, direct long-term adverse impacts to, and create similar long-term beneficial recreational opportunities for, OHV users as described under the Proposed Action. OHV use within the MBPA would be limited to existing roads and trails Approximately 2,324 acres of land within the MBPA designated as Limited Use would be converted to well pads and other project facilities in the long term. ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on OHV travel.

***Wetlands Recreation***

Under Alternative D, no surface disturbance would occur within the Pariette Wetlands ACEC (see **Section 4.15.1.4.1**). No disturbance to the trail or parking lot of the Pariette Wetlands ACEC is anticipated. Users of the ACEC would experience higher traffic to and from the trail and parking lot as a result of increased project related traffic within the MBPA above background levels. Mitigation measures for impacts to wetland and riparian areas are discussed in **Section 4.7.3**. Compared to the Proposed Action, Alternative D would have no direct long-term adverse impacts to wetlands recreation because no wetland habitat would be disturbed.

***Hiking***

As noted in **Section 3.13.1**, few people use the MBPA for hiking because there are relatively few attractions for hikers. As such, there would be relatively minor adverse impacts to this recreation user group from well development. Under Alternative D, there would be fewer impacts related to hiking than under the Proposed Action. No disturbance to the existing trail or parking lot of the Pariette Wetlands ACEC, or to proposed improvements, is anticipated. As noted in the Proposed Action section, ACEPMs detailed in **Sections 2.2.12.4** and **2.2.12.9** would reduce the visual impacts and the potential impacts to the recreational experience.

## 4.13.2 Mitigation

In addition to the ACEPMs detailed in **Section 2.2.12**, the following proposed mitigation measures could be applied to reduce impacts to recreational resources:

- Low-profile tanks would be used to reduce visual impacts to recreationists at the direction of the AO.
- Newfield would use offsite tanks or centralized tank batteries at production locations to reduce visual impacts to recreationists whenever possible. The feasibility of using offsite tanks or centralized tank batteries would be determined on a site-specific basis.
- Newfield and the AO would perform the following actions during APD processing when feasible:
    - Jointly determine the use of topographic features to serve as visual screens
    - Place facilities away from highly visible points such as ridgelines
    - Use low-profile tanks to reduce visibility where taller tanks would be more visible
    - Use noise-reducing technology to reduce noise levels experienced by river recreationists to "quiet" levels
    - Avoid excessive side-casting of earth materials from ridgelines and steep slopes
- No wells, roads, or other surface disturbance would be allowed on the Pariette trail or parking lot.
- Except for the proposed water well, no surface disturbing activities would occur within 0.5 miles or line of sight of the river.
- The proposed water well will be screened from the viewshed of the river as much as possible.

## 4.13.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts to recreational resources include the long-term loss of primitive, dispersed, and unconfined recreational opportunities from surface-disturbing activities increased vehicle traffic, adverse visual impacts, and adverse noise impacts. Other unavoidable adverse impacts apply to specific groups of recreationists such as hunters, who would be impacted indirectly by direct impacts to big-game herds and game habitat fragmentation in the area. In areas of concentrated development, change in natural settings would be an unavoidable long-term adverse impact to recreational resources, including visual impacts to river recreationists along the Green River under the Proposed Action and Alternatives C and D.

### 4.13.4 Irretrievable and Irreversible Commitments of Resources

No irretrievable impacts to recreation are anticipated as a result of this project. Irreversible impacts to recreational resources would include the alteration of natural settings where long-term development (i.e., roads) occurs and cannot be reclaimed due to continued use.

### 4.13.5 Relationship of Short-Term Uses to Long-Term Productivity

Hunting and dispersed camping opportunities would be impaired by the short-term use of the MBPA for well development. However, project development would not impact long-term productivity of recreational resources because reclamation would restore the recreational values of the land and hunting opportunities. While permanent project-related roads would alter the suitability of these areas for non-motorized recreation use, they would provide continued access to recreational opportunities for others, such as OHV users and hunters.

## 4.14 VISUAL RESOURCES

This section of the EIS describes the potential impacts of oil and gas infill development to visual resources within the MBPA. Short-term impacts are those that would affect visual resources for fewer than 5 years, and long-term impacts would affect visual resources for more than 5 years (BLM 1986). As described in **Section 3.14.1**, the MBPA is moderately developed with oil and natural gas wells, and the general feel of the area is semi-industrial. Existing access roads, pump jacks, storage tanks, and aboveground pipelines are a prominent part of the viewscape. The potential adverse impacts to visual resources would include the added human-made form, color, and linear contrasts to the natural landscape created by construction equipment, pipelines, well pads, access roads, and other forms of infrastructure associated with infill development. Invasive weeds resulting from project related activities and increased road in the MBPA can also adversely affect the visual character of an area.

As described in **Section 3.14.2**, the BLM's VRM system is used to inventory and then designate VRM classes to manage visual resources under visual resource objectives. All proposed activities and projects in that area's VRM class must meet and/or comply with the applicable VRM objectives. Project-specific compliance with VRM objectives is determined by using a contrast rating system that assesses the degree of project-related changes to the existing landscape by assessing the potential changes to the existing form, line, color, and texture of landforms and/or water, vegetation, and structures. Visual impacts resulting from infill development can be calculated by analyzing the potential impacts from proposed surface disturbances and the number of proposed wells to assess their visual impact on the MBPA's VRM classes.

### 4.14.1 Direct and Indirect Effects

The MBPA has lands designated as VRM Class II, Class III, and Class IV. No VRM Class I lands (i.e., lands designated as having the highest visual resource quality) have been designated within the MBPA. VRM Class II management objectives are to retain the existing character of the landscape and allow only minor changes. VRM management objectives for Class III are to partially retain the existing character of the landscape, allowing for moderate change. VRM Class IV management objectives allow for major changes to the characteristic landscape that would accommodate management activities (BLM 2008b). **Table 4.14-1** summarizes the acreage of VRM class disturbed by each alternative.

**Table 4.14-1. Initial Surface Disturbance within the MBPA by VRM Class and Alternative**

| VRM Class | Surface Acres | Initial Surface Disturbance (acres) | | | |
|---|---|---|---|---|---|
| | | Alt. A – Proposed Action | Alt. B – No Action | Alt. C – Field-wide Electrification | Alt. D – Resource Protection |
| II | 386 | 1 | -- | 1 | 14[12] |
| III | 20,837 | 2,452 | 7 | 2,496 | 964 |
| IV | 82,661 | 11,270 | 69 | 11,463 | 7,282 |

Note: No VRM Class I lands are located within the MBPA.

### 4.14.1.1 Alternative A - Proposed Action

Under the Proposed Action, development would occur in BLM areas designated as VRM Class II, Class III, or Class IV. Construction of up to 5,750 well and associated pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 16,129 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 7,808 acres (see **Table 2.3-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Approximately 2,452 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 11,270 acres of disturbance would occur in VRM Class IV designated areas. Only one acre of VRM Class II land would be disturbed, due to existing roads that would require improvement or upgrade.

The proposed development within the designated VRM Class III and Class IV areas would be consistent with management objectives for these visual classes. These objectives would permit moderate to major changes to the characteristic landscape that would accommodate the level of surface disturbance and visual contrasts created by proposed development. VRM Class II objectives are more restrictive; however, given that only one acre of VRM Class II land would be disturbed, the effects of the Proposed Action would be negligible.

Short-term effects on visual resources would be related to surface disturbance reclamation success, and the effects would diminish as vegetation becomes reestablished. However, the potential establishment of invasive species in surface-disturbed areas would increase the risks of wildland fire, and potentially alter short- and long-term scenic quality because of the visual contrasts created by fire. Short-term impacts on scenic quality from wildland fire would be in areas of relatively fast-growing herbaceous or forb vegetation, in which the visual contrasts would quickly diminish. Long-term impacts could occur within relatively slow-growing shrub or woodland areas (e.g., sagebrush or pinyon-juniper woodland). Regrowth of species in these areas, which could reduce visual contrasts, could take more than five (5) years.

**Section 4.7**, *Vegetation*, discusses the potential effects associated with vegetation in more detail.

[12] With the exception of the water collector well, surface disturbance would be precluded in riparian and 100-year floodplain habitats (which overlaps the Class II areas in the MBPA). Therefore, surface disturbance would be substantially lower in Class II areas than currently reflected on project maps and **Table 4.14-1**.

Short-term impacts also would include drilling rig visibility at drilling locations because the rigs would be moved weekly or monthly depending on site-specific drilling depths. Long-term impacts would include pipeline, infrastructure and well pad visibility, as well as surface disturbances from well pad and access road construction.

As set forth in **Table 2.1-1**, the project would be required to comply with the provisions of Chapter 4 of the BLM's *Gold Book*, which specifies that existing topography would be used to screen roads, pipeline corridors, drill rigs, wells, and production facilities from view where practical. Newfield would paint all aboveground production facilities with approved colors (or specified standard environmental colors) to blend with adjacent terrain, except for facilities requiring safety coloration per OSHA requirements. New roads generally would be required to follow natural contours and provide visual screening and would be reclaimed to BLM standards. Pipeline ROW would be located within existing ROW, whenever possible. Aboveground facilities would be painted with appropriate, non-reflective standard environmental colors, as specified by the AO. The AO may also specify additional measures to reduce visual impacts of pipelines, such as topographic screening, vegetation manipulation, project scheduling, and traffic control procedures.

Potential direct impacts associated with the Proposed Action would include artificial light and related light pollution (e.g., sky glow) from night lighting required for night-time drilling. Night lighting would degrade scenic quality by contributing to the intrusive artificial lighting of oil and gas operations. This would be of particular concern in the Green River areas. Compliance with the provisions from the Gold Book described in the previous paragraph would reduce potential adverse impacts from lighting at well drilling sites.

The indirect visual effects of the development would include vehicle-related fugitive dust, which could adversely impact long-distance scenic quality. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions.

#### 4.14.1.2 Alternative B - No Action

Under the No Action Alternative, development would occur in BLM areas designated as VRM Class III or Class IV. No VRM Class II lands would be disturbed.

Under the No Action Alternative, construction of up to 788 wells and associated pads, access roads, pipelines, and facilities would result in the initial disturbance of approximately 870 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 659 acres (see **Table 2.4-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Approximately 7 acres of initial surface disturbance would occur in VRM Class III designated areas, and about 69 acres of disturbance would occur in VRM Class IV designated areas. No VRM Class II lands would be disturbed. When compared to other alternatives, the No Action Alternative would have the least adverse impacts to visual resources because fewer acres of surface disturbance would occur as a result of the proposed development.

The proposed development within the designated VRM Class III and Class IV areas would be consistent with management objectives for these visual classes, as described under the Proposed Action. Short-term effects on visual resources would be similar to those under the Proposed Action, although they would be less extensive because fewer numbers of acres would be disturbed. These effects would include those related to surface disturbance reclamation success, as described under the Proposed Action. **Section 4.7**, *Vegetation*, discusses the potential effects associated with vegetation in more detail.

Short-term impacts also would include drilling rig visibility at drilling locations. Long-term impacts would be similar to those under the Proposed Action, though less extensive. As noted in the discussion under the Proposed Action, the project would comply with the provisions of Chapter 4 of the BLM's *Gold Book* and would implement other requirements to reduce impacts on visual resources.

Potential direct impacts associated with the No Action Alternative would include artificial light and related light pollution (e.g., sky glow) from night lighting required for night-time drilling. However, these direct impacts would be less under the No Action Alternative than under the other alternatives because fewer wells would be drilled. Compliance with the provisions from the Gold Book described in the previous paragraph would reduce potential adverse impacts from lighting at well drilling sites.

The indirect visual effects of the development would include vehicle-related fugitive dust, which could adversely impact long-distance scenic quality. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions.

### 4.14.1.3 Alternative C – Field-Wide Electrification

Under Alternative C, 5,750 wells would be proposed for drilling on Federal, State and private lands or minerals in the MBPA – the same number as discussed under the Proposed Action. This would result in the initial disturbance of approximately 16,308 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 7,925 acres (see **Table 2.5-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Under Alternative C, approximately 11,463 acres of initial surface disturbance would occur in VRM Class IV areas, and approximately 2,496 acres of disturbance would occur in VRM Class III areas. Only one acre of initial surface disturbance would occur in VRM Class II areas, due to existing roads that would require improvement or upgrade. No power lines or substations would be installed in the VRM Class II area.

The impacts to visual resources would be generally similar to those discussed under the Proposed Action, both short- and long-term. Potential direct impacts associated with Alternative C would include artificial light and related light pollution with similar impacts to those of the Proposed Action. As with the Proposed Action, the indirect visual effects would include vehicle-related fugitive dust. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions. However, with the installation of power lines and substations to support well operations, Alternative C would likely have greater visual impacts than the Proposed Action.

### 4.14.1.4 Alternative D - Resource Protection

Under Alternative D, up to 5,058 wells would be proposed for drilling on State and private lands or minerals in the MBPA. This would result in the initial disturbance of approximately 9,805 acres. Following interim reclamation, residual surface disturbance from infill development would be reduced to approximately 2,818 acres (see **Table 2.6-1**). **Table 4.14-1** shows the acres of potential initial surface-disturbing impacts within each VRM class. Under Alternative D, approximately 7,282 acres of initial surface disturbance would occur in VRM Class IV areas, and approximately 964 acres of disturbance would occur in VRM Class III areas. Approximately 14 acres of initial surface disturbance would occur in VRM Class II areas. There are conceptual ROWs, proposed 160-acre spacing well pads utilized for directional drilling into the ACEC, and proposed 160-acre spacing Green River pads located within VRM Class II areas under this alternative.

The short- and long-term impacts to visual resources would be the same as discussed under the Proposed Action, but the degree of impacts would be less because fewer acres of surface disturbance from infill development would be proposed under this alternative. More VRM Class II lands would be disturbed under Alternative D than under any other alternative. However, given that there are approximately 386 acres of VRM Class II lands within the MBPA, the amount that would be disturbed is small. Moreover, some of the initially disturbed area would be reclaimed after completion of well development, so the long-term disturbance would be less.

Potential direct impacts associated with Alternative D would include artificial light and related light pollution with similar impacts to those discussed under the Proposed Action. As with the Proposed Action, the indirect visual effects would include vehicle-related fugitive dust. **Section 4.2**, *Air Quality*, provides more information on project effects associated with dust emissions.

### 4.14.2 Mitigation

Proposed mitigation measures are the same under all alternatives. On-site visual reviews during the APD process would determine if sufficient mitigation could be applied to meet VRM class objectives. The following BLM VRM mitigation measures could be applied to reduce impacts to visual resources:

- Camouflage coloring, facility design, low-profile structures, proper placement, edge feathering along access roads and vegetation/road boundaries, and/or topographic screening would be used to reduce or eliminate the observable effects of well pads, roads, and infrastructure. Topographic screening and proper placement could include hiding the facilities behind ridge lines, in natural depressions, behind vegetation, or behind rock outcrops.
- Surface disturbances would be minimized by sharing ROWs, off-site directional drilling, and off-site placement of storage tanks.
- Pipelines would be buried in the road when feasible.
- In VRM Class II areas, night-lighting and light pollution sky glow impacts would be reduced (as feasible) by using only the minimal lighting required for safety and security, installing lights at the minimal heights required, and installing hoods on lights to reduce light diffusion.
- To preserve the integrity of viewsheds during APD processing, Newfield and the AO would perform the following actions when feasible:
    - Jointly determine the use of topographic features to serve as visual screens
    - Place facilities away from highly visible points such as ridgelines
    - Use low-profile tanks to reduce visibility where taller tanks would be more visible
    - Avoid excessive side-casting of earth materials from ridgelines and steep slopes
- Newfield would use centralized tank locations for water and condensate tanks to reduce visual impacts whenever possible. The feasibility of centralizing tank facilities would be determined on a site-specific basis.
- Unless no other alternative exists, surface disturbances would be avoided in VRM Class II areas.

### 4.14.3 Unavoidable Adverse Impacts

The presence of drilling rigs and the construction of well pads, pipelines, gas production infrastructure, and access roads would be an unavoidable consequence of well development and extraction. These activities would cause adverse surface disturbance and visual intrusion impacts to visual resources by introducing line, color, form, and textural contrasts onto the existing natural landscape in the long term, and by reducing the natural appearance present in some parts of the MBPA. Night-lighting would cause sky glow impacts in the short-term to the river.

As discussed above, proposed development under Alternatives A, C, and D would impact designated VRM Class II areas. Site-specific visual analysis during the APD process would determine if sufficient mitigation could be applied to meet VRM Class II objectives. Where valid and existing leasing rights predate the current RMP, unavoidable adverse impacts to scenic quality could result from project-related development. However, BMPs for the site-specific use of buried pipelines and centralized water and condensate tank facilities would reduce the visual impacts of pipelines and tanks, where appropriate. ACEPMs detailed in **Section 2.2.12.4** would reduce the impacts of buried pipelines for site-specific use on visual resources. In addition, ACEPMs detailed in **Section 2.2.12.9** would reduce visual impacts of centralized water and condensate tank facilities for site-specific use.

### 4.14.4 Irretrievable and Irreversible Commitments of Resources

There would be no irreversible impacts expected for visual resources as a result of the Proposed Action and alternatives. Areas of surface disturbances can be reclaimed; well bores can be capped and buried; pipelines can be removed; and access roads can be closed and reclaimed. There would be a long-term irretrievable loss of scenic quality during the approximate 41- to 51-year LOP resulting from the presence of the above-mentioned wells and infrastructure that would remain (until these structures were removed and/or the disturbed areas were reclaimed) after an estimated 30-year lifetime for each producing well.

### 4.14.5 Relationship Of Short-Term Uses To Long-Term Productivity

The short-term development and extraction of fluid minerals resources would have long-term adverse impacts on visual resources and scenic quality. Surface disturbances from access road and well-pad construction, and the presence of drilling rigs would introduce line, form, color, and texture contrasts into the landscape. These contrasts would reduce long-term scenic quality by disturbing the existing character of the natural landscape during the LOP and after the project has ended until reclamation and revegetation have successfully obscured the project impacts. However, it is anticipated that the long-term adverse impacts to visual resources would still comply with BLM VRM objectives.

## 4.15 SPECIAL DESIGNATIONS

The MBPA contains or is near three specially designated areas that the BLM currently manages for conservation purposes under its multiple-use mandate. Two of these are designated as ACECs, and the third is part of a suitable WSR area. Potential impacts to each of those areas are discussed below. While each area is discussed individually in this section, it is important to note that two of the three areas overlap significantly (the Lower Green River Corridor ACEC and the proposed Lower Green River WSR), and the remaining area (Pariette Wetlands ACEC) overlaps partially with the other two areas. Therefore, potential impacts disclosed in this section are not of an additive nature. Approximately 11,757 acres of the existing Pariette Wetlands ACEC and 238 acres of the Lower Green River Corridor ACEC fall within the MBPA. There are currently no WSR areas designated in the MBPA.

## 4.15.1 Direct and Indirect Effects

### 4.15.1.1 Alternative A - Proposed Action

#### 4.15.1.1.1 Areas of Critical Environmental Concern

***Pariette Wetlands ACEC***

This ACEC is managed by the BLM VFO. The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in **Section 3.15.1**. They include special-status bird and plant species habitat and wetland ecological systems and processes. If the Proposed Action were implemented, up to approximately 1,209 acres would be initially disturbed in the Pariette Wetlands ACEC. Approximately 376 wells, 21.9 miles of road and pipeline, and associated ancillary facilities would be constructed within the ACEC as a result of the Proposed Action. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 439 acres.

The potential direct and indirect impacts to vegetation are discussed in **Section 4.7**. As noted in **Section 4.7**, the Proposed Action would result in the initial disturbance of approximately 677 acres of wetlands, of which 256 acres would be disturbed after reclamation. Although the acreage is not exactly known, it is expected that wetland areas within the Pariette Wetlands ACEC would be disturbed as a result of the Proposed Action.

The potential direct and indirect impacts to special-status species are discussed in **Section 4.10**. Special-status species that could potentially be disturbed by activities within the ACEC include western yellow-billed cuckoo, Uinta Basin hookless cactus, Pariette cactus, and several Colorado River fish species. Development in sensitive plant species habitat in the ACEC would be done in accordance with protection measures and stipulations as discussed in **Section 4.10.2**. The potential effects to wildlife from development in the ACEC, along with related protection measures and mitigation, are discussed in **Sections 4.9.2** and **4.10.2**.

According to the Vernal RMP, the objective of the ACEC program is to designate and manage areas where special management attention is required to protect and prevent irreparable damage to important historic, cultural, or scenic values; fish and wildlife resources; or other natural systems or processes; or to protect life and safety from natural hazards. This objective applies to both the Pariette Wetlands ACEC and the Lower Green River Corridor ACEC, which have values identified as requiring protection.

***Lower Green River Corridor ACEC***

The "relevant and important" values for which the Lower Green River Corridor ACEC is designated are discussed in detail in Section 3.15.1. They include riparian habitat and high-quality scenic values. Under the Proposed Action, approximately 0.02 acres would be disturbed within the Lower Green River Corridor ACEC, due to an existing ROW that would require improvement or upgrade. The improvement is considered unlikely to disturb existing riparian habitat in this ACEC.

It is possible that well infrastructure would be visible from certain portions of the Lower Green River Corridor ACEC, thereby having an effect on scenic values. However, as discussed in **Section 4.14.1**, the Proposed Action would have very limited impact on high-quality (VRM Class II) landscapes. In addition, well infrastructure would be in general conformance with the ACEC visual objectives because all

permanent (on-site for 6 months or longer) structures constructed or installed at the well pads would be painted a flat, non-reflective earth-tone color to match one of the standard environmental colors, as determined by the appropriate SMA. Overall, there would be minimal impact on the "relevant and important" values for which the ACEC was designated (see **Section 3.15.2** for details).

#### 4.15.1.1.2 Wild and Scenic Rivers

Even though no WSR areas have been designated within the MBPA, suitable WSRs have been carried forward in the Vernal RMP. Projects located within WSRs have the potential to impact the ORVs for which the river has been analyzed. For the proposed Lower Green River WSR, the ORVs are recreational use and fish habitat.

Under the Proposed Action, approximately 1.5 acres would be initially disturbed within the proposed Lower Green River WSR, and no wells or roads would be constructed. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to zero. Therefore, there would be no substantial direct impacts to recreational uses in the immediate environment. The potential effects to fish habitat from the Proposed Action, along with related protection measures and mitigation, are discussed in **Sections 4.9.2** and **4.10.2**.

Indirect impacts to the ORVs for which the Lower Green River was found eligible for designation could include possible auditory disturbance to recreational users on the river, which is discussed in **Section 4.13**; potential visual intrusions in the middleground distance, which is discussed in **Section 4.14**; and potential increases in sedimentation and depletion of the river, the impacts of which are discussed in **Section 4.6**. The potential impacts on fish habitat are discussed in **Section 4.9**.

### 4.15.1.2 Alternative B - No Action

#### 4.15.1.2.1 Areas of Critical Environmental Concern

***Pariette Wetlands ACEC***

The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in **Section 3.15.1**. They include special-status bird and plant species habitat and wetland ecological systems and processes. The potential direct and indirect impacts to vegetation and to special-status species are discussed in **Sections 4.7** and **4.10**, respectively.

Under the No Action Alternative, no development would occur in the Pariette Wetlands ACEC. Therefore, the No Action Alternative would have no impact on special-status species habitat or wetland ecological processes within the ACEC.

***Lower Green River Corridor ACEC***

Under the No Action Alternative, no development would occur within the Lower Green River Corridor ACEC. Infrastructure visible from the ACEC would be in general conformance with the Lower Green River ACEC visual objectives because all permanent (onsite for 6 months or longer) structures constructed or installed at the well pads would be painted a flat, non-reflective earth-tone color to match one of the standard environmental colors, as determined by the appropriate SMA. Therefore, there would be no substantial impact to the relevant and important values for which the ACEC was designated.

#### 4.15.1.2.2 Wild and Scenic Rivers

Under the No Action Alternative, no development would occur within the proposed Lower Green River WSR. Therefore, there would be no direct impacts to the ORVs in the immediate environment. Indirect impacts to the ORVs for which the Green River was found eligible for designation would be minimal, because no development would occur in the proposed WSR area.

### 4.15.1.3 Alternative C - Field-wide Electrification

#### 4.15.1.3.1 Areas of Critical Environmental Concern

***Pariette Wetlands ACEC***

The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in **Section 3.15.1**. They include special-status bird and plant species habitat and wetland ecological systems and processes. The potential direct and indirect impacts to vegetation and to special-status species are discussed in **Sections 4.7** and **4.10**, respectively.

If Alternative C were implemented, up to approximately 1,211 acres would be initially disturbed in the Pariette Wetlands ACEC. The same number of wells and miles of road and pipeline, and associated ancillary facilities would be constructed within the ACEC under this alternative as would occur under the Proposed Action. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 441 acres. Impacts of Alternative C on wetland ecological processes and special-status species habitat would be similar to those described under the Proposed Action. However,

***Lower Green River Corridor ACEC***

Under Alternative C, approximately 0.02 acres would be disturbed within the Lower Green River Corridor ACEC, due to an existing ROW that would require improvement or upgrade. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to less than one. Therefore, impacts on riparian habitat and high-quality scenic values would be similar to those described under the Proposed Action. Therefore, there would be minimal impact on the relevant and important values for which the ACEC was designated.

#### 4.15.1.3.2 Wild and Scenic Rivers

Under Alternative C, approximately 1.5 acres would be initially disturbed within the proposed Lower Green River WSR, and no wells or roads would be constructed. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to zero. Therefore, there would be no substantial direct impacts to the ORVs in the immediate environment, similar to conditions under the Proposed Action. Indirect impacts to the ORVs for which the Green River was found eligible for designation would be similar to those described under the Proposed Action.

#### 4.15.1.4 Alternative D – Resource Protection

##### 4.15.1.4.1 Areas of Critical Environmental Concern

***Pariette Wetlands ACEC***

The "relevant and important" values for which the Pariette Wetlands ACEC is designated are discussed in detail in **Section 3.15.1.1**. They include special-status bird and plant species habitat and wetland ecological systems and processes. The potential direct and indirect impacts to vegetation and to special-status species are discussed in **Sections 4.7** and **4.10**, respectively.

If Alternative D were implemented, no new surface disturbance would occur within the Pariette Wetlands ACEC. Impacts of Alternative D on wetland ecological processes and special-status species habitat would be similar to those described under the Proposed Action, but would be less extensive due to the lack of surface disturbance within the ACEC.

***Lower Green River Corridor ACEC***

Under Alternative D, no development would occur within the Lower Green River Corridor ACEC. Impacts on riparian habitat and high-quality scenic values within this ACEC would be similar to those described under the No Action Alternative. Therefore, there would be minimal impact on the relevant and important values for which the ACEC was designated.

##### 4.15.1.4.2 Wild and Scenic Rivers

Under Alternative D, development of less than 6 acres would occur within the proposed Lower Green River WSR. Three wells and approximately 0.75 miles of roads and pipelines would be constructed within the proposed WSR area as a result of this alternative. Following interim reclamation, residual surface disturbance of the ACEC would be reduced to approximately 3 acres. While some surface disturbance would remain after interim reclamation, it is not expected to have substantial direct impact on the recreational use ORV that is part of the proposed WSR. Water recreational uses would be unaffected by these land disturbances.

Indirect impacts to the ORVs for which the Lower Green River was found eligible for designation could include possible auditory disturbance to recreational users on the river, which is discussed in **Section 4.13**; potential visual intrusions in the middleground distance, which is discussed in **Section 4.14**; and potential increases in sedimentation and depletion of the river, the impacts of which are discussed in **Section 4.6**. The potential impacts on fish habitat are discussed in **Section 4.9**.

### 4.15.2 Mitigation

The following proposed mitigation measures could be applied to reduce impacts to special designations, with relevant and important ACEC value or ORV addressed by the measure in parentheses:

1) Newfield and the AO would perform the following actions during APD processing when feasible:
    a) Jointly determine the use of topographic features to serve as visual screens
    b) Place facilities away from highly visible points such as ridgelines

c) Use low-profile tanks to reduce visibility where taller tanks would be more visible and

d) Avoid excessive side-casting of earth materials from ridgelines and steep slopes

(Scenic value in Lower Green River ACEC, recreational value in Lower Green River proposed WSR)

2) Placement of tanks and drilling pads would be considered, and off-site tanks may be used to minimize visual impacts (Scenic value in Lower Green River ACEC, recreational value in Lower Green River proposed WSR).

3) Newfield would use offsite tanks or centralized tank batteries at production locations to reduce visual impacts whenever possible. The feasibility of using offsite tanks or centralized tank batteries would be determined on a site-specific basis (Scenic value in Lower Green River ACEC, recreational value in Lower Green River proposed WSR).

4) Directional drilling would be used to reduce or avoid impacts to the ACEC relevant values where feasible (All relevant and important values of ACECs and ORVs of proposed WSR).

### 4.15.3 Unavoidable Adverse Impacts

Unavoidable adverse impacts to special designations include the following:

- Increases in the number of acres of disturbance to special status species' habitat within the Pariette Wetlands ACEC under the Proposed Action and Alternative C and within the proposed WSR area under Alternative D
- A reduction of noise-free and scenic qualities within the Pariette Wetlands ACEC and proposed WSR area under the action alternatives
- A reduction of noise-free and scenic qualities within the Lower Green River Corridor ACEC under the Proposed Action and Alternative C

### 4.15.4 Irretrievable and Irreversible Commitments of Resources

With proper mitigation and remediation, most special management area resources and values would have no projected irretrievable commitments of resources. The only potential irretrievable commitments of resources would be as follows:

- Reduction of noise-free and scenic qualities within the Lower Green River ACEC and proposed WSR area
- Reduction of riparian and waterfowl habitat in Pariette Wetlands ACEC
- Disturbance of special status plant species habitat within the ACECs

These resources would be impacted irretrievably during the project time period because the former would be affected regardless of mitigation. Once the project is over, these resources can be reclaimed.

### 4.15.5 Relationship of Short-Term Uses to Long-Term Productivity

Short-term uses related to well development could impact the long-term values of special designation areas in the following ways: direct disturbance to relevant values through removal of riparian resources; disturbance of special status species and wildlife habitat; disturbance and/or irreversible loss of cultural resources; and loss of scenic quality. However, the impacts of well development would not adversely affect the long-term productivity of the special designation area resources and values. During the extraction phase of the project, impacts would continue for the LOP; however, long-term productivity would not be substantially impacted because the level of impact to special designation area values is low and most impacts would be reclaimed.

## 4.16 SOCIOECONOMICS

The development of wells and associated infrastructure under each of the alternatives would directly impact the social and economic resources of the MBPA as a result of its employment requirements, capital expenditures, and tax and royalty payments. These direct impacts of development would also indirectly affect local housing availability, the population of Uintah and Duchesne Counties, and the demand for social services in those counties. For this EIS, social impacts are typically discussed qualitatively because quantitative data that addresses such impacts are often not available. To the extent possible, economic impacts are quantified based on simplified assumptions and estimates of employment, production, and revenue.

### 4.16.1 Direct and Indirect Effects

#### 4.16.1.1 Alternative A - Proposed Action

##### 4.16.1.1.1 Population and Demographics

Because Duchesne and Uintah Counties have resource-based economies, the Proposed Action would contribute to the population growth that is driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. The Proposed Action would have a greater impact on the population of these two counties than the other alternatives because it would drill the most wells.

Population increases would fluctuate throughout the LOP, with the highest increases in population occurring during the initial construction phase. Many oil/gas-related jobs are temporary in which certain workers may be needed for only a few months. Short-term employees are likely to stay in motels, apartments, and travel trailers on the job site, and would not likely contribute substantially to the permanent local population.

##### 4.16.1.1.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the Proposed Action. Based on information in **Table 2.3.6-1** of this EIS, the Proposed Action would employ approximately 478 people on average per day throughout the construction phase, and 46 people on average per day throughout the operation and maintenance phase. The increase in employment would not occur all at once but would fluctuate over the LOP. In addition, jobs in the mining,

construction, and services industries would also increase to serve the people employed in well construction and operations.

In large part, initial well construction draws temporary employees to the region. Local employees in the retail and service trades are required to meet the needs of the temporary workers. Once well construction is complete, temporary workers leave the area and local employees are often hired to maintain wells. This suggests that mineral development boosts short-term employment levels, but does not maintain similar long-term levels (BLM 2008b). The unemployment rate would likely decrease temporarily as additional jobs in industry and service become available, although some of these jobs may be filled from people employed in other job sectors and by new workers who move to the area.

With increased employment opportunities and investment in well drilling and operations, overall income in Duchesne and Uintah Counties would increase from existing levels. The Proposed Action would have a greater impact on overall income than the other alternatives (except for Alternative C where the same number of wells would be drilled) because it would drill more wells. As with employment, overall income levels would fluctuate over the LOP, with the highest increases occurring during the initial construction phase when more workers would be employed. Since many of the jobs would be temporary, overall income increase would be more modest as the project progresses, especially after construction work is completed.

#### 4.16.1.1.3 Taxes and Revenue

According to the Utah Energy Office (UEO), the drilling and completion of a single gas well would result in beneficial impacts to local governments from services provided as well as tax and other revenue received. Sources for this revenue include general sales tax, individual and corporate income tax, employee retirement, and motor fuel sales tax. Expenditures include intergovernmental, education, transportation, health, police, fire, and corrections (UEO 2004). **Table 4.16.1.1.3-1** shows the anticipated revenues and expenditures for the Uinta Basin area.

**Table 4.16.1.1.3-1. Revenue and Expenditures per Well, Uinta Basin**

| Category | Estimated Dollars per Well |
|---|---|
| Local Revenues | $42,200 |
| Local Expenditures | $14,000 |
| Net Local Revenues | $28,200 |

Note: The UEO assumes a 100-well per year drilling and completion project. This is in line with the assumption for the project of 6–11 wells completed per month (or 70–130 per year).
Source: Utah Energy Office 2004.

Based on the assumption regarding net revenue per well in **Table 4.16.1.1.3-1** and a total of 5,750 wells proposed under the Proposed Action, net local revenue annually would total a maximum of approximately $162.2 million to the combined Uintah County and Duchesne County economies. **Table 4.16.1.1.3-2** illustrates the maximum net local revenue that would be generated annually per alternative, with the Proposed Action and Alternative C being the highest among alternatives.

**Table 4.16.1.1.3-2. Maximum Annual Revenue per Alternative**

| Category | Alternative A – Proposed Action | Alternative B – No Action | Alternative C – Field-wide Electrification | Alternative D – Resource Protection |
|---|---|---|---|---|
| Number of Wells | 5,750 | 788 | 5,750 | 5,058 |
| Local Revenue ($ million)* | 162.2 | 22.2 | 162.2 | 142.6 |

*Assumes a net local revenue of $28,200 per well over the life of the well (see **Table 4.16.1.1.3-1**).

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels as more oil and gas wells become productive. As noted in **Section 3.16.3.6**, both counties receive a larger share of their property tax revenues from oil and gas operation than other counties in the state on average. The Proposed Action would at least maintain this condition and could potentially increase that share. However, property tax revenues would decline as wells go out of production.

Because no Indian trust leases or surface are present within the MBPA, no revenues are expected to be generated for the Ute Indian Tribe.

### 4.16.1.1.4 Quality of Living

***Public Facilities and Services***

Under the Proposed Action, the anticipated increase in population would increase the need for social services and infrastructure (BLM 2008b). Although the exact population increase cannot be accurately forecasted, any population increase would be accompanied by a proportional increase in demands on community resources such as police and fire protection. Both Duchesne and Uintah Counties are currently experiencing difficulties in keeping up with the demand on utilities and infrastructure. Advertisements are continually posted to maintain the infrastructure needs of the area, but there is an inadequate workforce to fill these positions (personal communication between Elisha Wardle, SWCA, and Tammy Ferguson, Uintah County Road Department, 2007). Because the Proposed Action proposes about seven (7) times more wells than the No Action Alternative, it would place proportionately more demands on the community infrastructure. Furthermore, the demand for public facilities and services under the Proposed Action would be similar to those for Alternatives C and D.

Increased revenues from well construction and production would provide affected jurisdictions with additional funding for their services. However, it is not known if the additional funds would adequately cover the costs for providing additional services to the population generated by the Proposed Action.

***Crime***

As noted above, the anticipated population increase would increase the demand for services such as police protection. In general, the volume of crime increases as the population increases; although a relationship between crime rates and increased population is less clear (Nolan, 2004). As noted above, population in both Duchesne and Uintah Counties would likely increase. The extent of this increase is not known; however, the highest increases would likely occur during the initial construction phase and decrease as the wells are drilled. Consequently, there could be an increase in the number of crimes during the initial construction phase of the Proposed Action, but this number would decrease during the LOP. Because the

Proposed Action is not expected to significantly affect the permanent local population, overall crime would not likely increase significantly from current levels, and may not change at all. However, the project could impact transient populations.

Project development may lead to increased opportunities for theft and vandalism at well sites during construction and drilling activities. The opportunities for crime under the Proposed Action would be similar to those for Alternatives C and D because more wells would be drilled. Increased activity and well site monitoring would discourage crime and vandalism activities, as would the installation of on-site security measures by the construction and drilling contractors.

***Housing***

The annual housing demand resulting from the Proposed Action would be greatest during the development phase of the project and would decrease considerably during the long-term production phase as fewer workers are required to operate wells. Depending on the amount of oil and gas activity in the region that is occurring during the development phase, the existing housing stock may or may not accommodate the increased demand.

In the early 2000s, the housing market in the region was characterized by substantial increases in new single-family home construction, escalating prices, and increased numbers of manufactured housing and mobile home units. Short-term accommodations were being met through local campgrounds, hotels, and motels. The increase in hotel stays made it challenging to accommodate travelers and tourists at the height of the tourist season (personal communication between Elisha Wardle, SWCA, and Bill Johnson, Uintah County-Vernal City Economic Development, 2006). In short, when oil and gas development was increasing in the early 2000s, housing availability was very low. Following the national economic slowdown in the late 2000s, housing availability in Uintah and Duchesne Counties has increased somewhat. Because the slowdown reduced both the pace of oil and gas development and increased unemployment, thereby generating an out-migration of workers, the demand for housing in the Uinta Basin has eased.

Thus, the incremental demand for housing as a result of the Proposed Action would have direct impacts on housing and tourism accommodations if oil and gas development is booming. The demand for short-term housing for in-migrants would likely lead to increasing numbers of manufactured and mobile homes as well as hotels and campsites. The increase in demand would cause an increase in housing prices and negatively affect affordability. Should the development occur when oil and gas in region is not at its peak, the supply of housing would be sufficient to meet the demand.

Given the amount of housing development that occurred in the early 2000s and the out-migration of workers in the late 2000s, the in-migrants who would work under the Proposed Action would find housing that is available and affordable. As noted in **Section 3.16.4.3**, housing costs in the Uinta Basin currently are approximately 85 percent of the statewide average. Numerous residential properties are available for sale, and there is a large stock of motel rooms and RV campgrounds available as temporary residences. As the project progresses, fewer employees would need to find housing.

#### 4.16.1.1.5 Environmental Justice

For this analysis, applicable environmental justice guidance was applied to determine whether there could be a disproportionately high or adverse human health or environmental impact on low-income, minority,

or tribal populations near the MBPA as a result of the implementation of the Proposed Action or action alternatives.

For many issues analyzed in the EIS, potential adverse impacts resulting from the Proposed Action or other alternatives would be site-specific to the MBPA. In these cases, environmental justice (EJ) communities would not be directly or indirectly impacted by changes to the MBPA. These resources include geology and minerals, paleontology, soils, water resources, vegetation, range resources, fish and wildlife, special status species, cultural resources, recreation, visual resources, and special designations. Thus, the only remaining resources that would be subject to adverse impacts as a result of the Proposed Action and would require further evaluation regarding potential adverse impacts to EJ communities are: air quality and greenhouse gases, land use and transportation, and socioeconomics. **Table 4.16.1.1.5-1** provides a list of resources and a rationale that was given as to whether the action alternatives would result in a disproportionate impact to EJ communities.

**Table 4.16.1.1.5-1. Potential Environmental Justice Impacts Common to All Action Alternatives**

| Issue | Adverse Impact to EJ Communities? | Disproportionate Impact to EJ Communities? |
|---|---|---|
| Air Quality/Greenhouse Gases | Yes | No. Air quality impacts, greenhouse gas impacts, ozone impacts, visual impacts, and impacts from other AQRVs are regional and global in nature, not localized to EJ communities |
| Geology and Minerals | No. Impacts limited to MBPA. | N/A |
| Paleontological Resources | No. Impacts limited to MBPA. | N/A |
| Soils | No. Impacts limited to MBPA. | N/A |
| Water Resources | No. The proposed project would not impact community drinking water supplies. | N/A |
| Vegetation | No. Impacts limited to MBPA. | N/A |
| Range Resources | No. Impacts limited to MBPA. | N/A |
| Fish and Wildlife | No. Loss of wildlife habitat and movement corridors is not directly connected to EJ populations, as these populations are not dependent on wildlife. | N/A |
| Special Status Species | No. Loss of USFWS-designated critical habitat is not directly connected to EJ populations, as these populations are not dependent on special status species. | N/A |
| Cultural Resources | No. Impacts limited to MBPA. | N/A |

| Issue | Adverse Impact to EJ Communities? | Disproportionate Impact to EJ Communities? |
|---|---|---|
| Land Use and Transportation | Yes | No. Land use impacts would be limited to the MBPA. Increases in project-related vehicle traffic would go directly through the EJ communities of Myton, Randlett, Fort Duchesne, and Whiterocks, and would contribute to an overall increase in traffic on U.S. Highway 40. All frequent users of U.S. Highway 40 would be impacted equally, without a disproportionate effect on EJ communities. |
| Recreation | No. Impacts limited to MBPA. | N/A |
| Visual Resources | No. Impacts to VRM areas would not be visible to EJ communities. Visual impacts in and around the MBPA would be experienced by all individuals, and not specifically by those in EJ communities. | N/A |
| Special Designations | No. Impacts to special designation areas would be experienced by all individuals, and not specifically by those in EJ communities. | N/A |
| Socioeconomics | Yes | No. As royalty revenues are dispersed to counties, the local communities would likely see beneficial economic impacts. Adverse impacts to population, employment, and housing would not likely disproportionately impact EJ communities. The workforce required to drill and complete wells would likely reside in more urban communities (given the proximity to services) and would not impact population and/or housing situation in the more rural EJ communities. The Proposed Action and alternatives could result in direct and indirect jobs for members of EJ communities, thus having a beneficial impact on EJ community employment opportunities. |

### *Air Quality*

Well field development would occur approximately 10 miles southwest of the Randlett CDP, which is the closest low-income and minority community. The Fort Duchesne and Whiterocks CDPs, also low-income and minority communities, are located approximately 13 and 25 miles north of the MBPA, respectively. The closest community to the MBPA is Myton, approximately 6 miles to the north.

**Section 4.2.1.1.2** discusses potential near field impacts from the Proposed Action. The criteria pollutants modeled, including CO, $PM_{10}$, $PM_{2.5}$, $NO_2$, and $SO_2$, all have modeled impacts below the applicable standards. Additionally, all of the maximum impacts occur within 200 meters (0.12 miles) of the emitting sources. Thus, near-field effects would not have an adverse impact on EJ communities located more than 0.12 miles from the MBPA. These near-field effects are described in **Section 4.2.1.1.2**. Therefore, disproportionate adverse health impacts related to poor air quality are not likely in the EJ communities closest to the MBPA.

***Land Use and Transportation***

At the peak of production, the Proposed Action would generate at most 1,725 trips per day within the MBPA (see **Table 4.12.1.1.2-1**), although actual trips generated would likely be lower. Increases in project-related vehicle traffic would go directly through the EJ communities of Myton, Randlett, Fort Duchesne, and Whiterocks, and would contribute to an overall increase in traffic on U.S. Highway 40. Prior to reaching Sand Wash Road west of Myton, project traffic would be confined to U.S. Highway 40, the main transportation corridor through most of the communities in the Uinta Basin. Although U.S. Highway 40 runs through Myton, this is also true of other non-EJ communities such as Vernal, Roosevelt, and Duchesne. Truck routes are currently signed in Myton, and heavy truck traffic warning signs are used by companies in accordance with UDOT rules. U.S. Highway 40 is the primary transportation route that links the EJ communities and other rural residents with services in Duchesne, Roosevelt and Vernal.

With the increased number of trips, the Proposed Action could increase the risk of traffic accidents more than any of the other alternatives. Members of the EJ communities, other Uinta Basin residents, and visitors who use the same transportation routes would all be subject to an increased probability of accidents, given their close proximity to the MBPA and their dependence on the larger cities in the area for goods and services. Because EJ community members are similarly dependent on U.S. Highway 40 as a main transportation route as other residents and workers in the Uinta Basin, they would not be disproportionately affected by traffic accident increases.

***Socioeconomics***

As royalty revenues are disbursed from the state to Uintah and Duchesne Counties as a result of the Proposed Action, the EJ communities could see increased funding to support economic development and infrastructure improvements. An increase in direct (well producers and operators) and indirect employment opportunities (service jobs that support the oil and gas industry) for members of the EJ communities could be provided as a result of the Proposed Action. Thus, an increase in funding and employment opportunities would provide a beneficial economic impact to the EJ communities near the MBPA.

### 4.16.1.2 Alternative B - No Action

#### 4.16.1.2.1 Population and Demographics

Because Duchesne and Uintah Counties have resource-based economies, the No Action Alternative would contribute to the population growth that is driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. Since this alternative would drill the fewest wells, the No Action Alternative would have a lesser impact on the population of these two counties than those for the other alternatives, including the Proposed Action.

As with the Proposed Action, population increases would fluctuate throughout the LOP under the No Action Alternative. The No Action Alternative is expected to contribute the least to the local population, since this alternative would have the fewest wells drilled, and therefore, would attract the fewest workers.

#### 4.16.1.2.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the drilling of proposed wells. Based on information in **Table 2.4.6-1** of this EIS, the No Action Alternative would employ approximately 468 workers on average per day during the construction phase, and 24 workers on average per day during the operation and maintenance phase. The increase in employment would not occur all at once but would fluctuate over the LOP. Other employment impacts discussed under the Proposed Action would apply to this alternative, although these impacts would be less extensive since fewer workers would be employed.

#### 4.16.1.2.3 Taxes and Revenue

Based on the assumption regarding net revenue per well in **Table 4.16.1.1.3-1** and a total of 788 wells proposed under this alternative, the annual net local revenue would total a maximum of approximately $22.2 million to the combined Uintah County and Duchesne County economies. **Table 4.16.1.1.3-2** illustrates the maximum annual net local revenue per alternative. The maximum net local revenue that would be generated annually under the No Action Alternative would be the least among all the alternatives.

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels. The No Action Alternative would generate the least property tax revenue among all the alternatives due to the smaller number of wells that would be drilled.

#### 4.16.1.2.4 Quality of Living

The impacts of the No Action Alternative on the quality of living in Duchesne and Uintah Counties - including impacts on public services, crime and housing – would be similar to those described under the Proposed Action. However, impacts are expected to be less extensive because fewer workers would be employed. In fact, the No Action Alternative would have less quality of living impacts than those for any of the alternatives because fewer wells would be drilled and fewer people would likely be employed.

#### 4.16.1.2.5 Environmental Justice

***Air Quality***

The air quality setting for the No Action Alternative is the same as that described under the Proposed Action. The No Action Alternative would have the same air quality impact on EJ communities as would occur under the Proposed Action. Impacts under the No Action Alternative would likely be even less due to the fewer number of wells that would be developed.

***Land Use and Transportation***

At the peak of production, the No Action Alternative would generate at most 233 trips per day within the MBPA (see **Table 4.12.1.1.2-1**), although actual trips generated would likely be lower. Traffic impacts

on EJ communities under the No Action Alternative would be similar to those described under the Proposed Action. However, impacts under the No Action Alternative would be less extensive due to the lower level of well development and the lower amount of traffic that would be generated.

***Socioeconomics***

As royalty revenues are disbursed from the state to Uintah and Duchesne Counties as a result of the Proposed Action, the EJ communities could see increased funding to support economic development and infrastructure improvements. An increase in direct (well producers and operators) and indirect employment opportunities (service jobs that support the oil and gas industry) for members of the EJ communities could be provided as a result of the No Action Alternative. Thus, an increase in funding and employment opportunities would provide a beneficial economic impact to the EJ communities near the MBPA, although the No Action Alternative would provide less of this beneficial impact than those for the other alternatives.

### 4.16.1.3 Alternative C – Field-wide Electrification

#### 4.16.1.3.1 Population and Demographics

Because Duchesne and Uintah counties have resource development–based economies, Alternative C would contribute to current population growth driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. Since Alternative C would have the same number of wells as the Proposed Action, population and employment impacts would also be the same.

#### 4.16.1.3.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the drilling of proposed wells. Based on information in **Table 2.5.3-1** of this EIS, Alternative C would employ approximately 486 workers on average per day during the construction phase, and 46 workers on average per day during the operation and maintenance phase. Approximately eight more workers would be employed during the construction phase under this alternative than under the Proposed Action because transmission lines and substations would need to be built along with other central facilities. The increase in employment would not occur all at once but would fluctuate over the LOP. Other employment impacts discussed under the Proposed Action would apply to this alternative.

#### 4.16.1.3.3 Taxes and Revenue

Based on the assumption regarding net revenue per well in **Table 4.16.1.1.3-1** and a total of 5,750 wells proposed under this alternative, annual net local revenue would total a maximum of approximately $162.2 million to the combined Uintah County and Duchesne County economies – the same as what would be expected under the Proposed Action. **Table 4.16.1.1.3-2** illustrates the maximum annual net local revenue per alternative.

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels as more oil and gas wells become productive. Alternative C would generate property tax revenues at the same level as those under the Proposed Action.

#### 4.16.1.3.4 Quality of Living

The impacts of Alternative C on the quality of living in Duchesne and Uintah Counties - including impacts on public services, crime and housing – would be the same as those described under the Proposed Action. Because Alternative C would have the same number of wells drilled as the Proposed Action, about the same number of employees and the same attendant quality of living impacts would be expected.

#### 4.16.1.3.5 Environmental Justice

***Air Quality***

The air quality setting for Alternative C is the same as that described under the Proposed Action. Alternative C would have less air quality impact on EJ communities as would the Proposed Action.

***Land Use and Transportation***

At the peak of production, Alternative C would generate at most 1,725 trips per day within the MBPA – the same number that would occur under the Proposed Action; however, actual trips generated would likely be lower. Traffic impacts on EJ communities under Alternative C would be the same as those described under the Proposed Action.

***Socioeconomics***

Socioeconomic impacts on EJ communities under Alternative C would be the same as those described under the Proposed Action because the number of wells that would be developed would be the same.

### 4.16.1.4 Alternative D – Resource Protection

#### 4.16.1.4.1 Population and Demographics

Because Duchesne and Uintah Counties have resource-based economies, Alternative D would contribute to the population growth that is driven by the recent increase in oil and gas development. It is assumed that the population would increase proportionately to the number of wells that would be developed under each alternative. Alternative D would have similar but lesser impact on the population of these two counties than that of the Proposed Action, since fewer wells would be drilled. As with the Proposed Action, population increases would fluctuate throughout the LOP under Alternative D.

#### 4.16.1.4.2 Employment and Income

The overall number of jobs available in the region surrounding the MBPA would likely increase as a result of the drilling of proposed wells. Based on information in **Table 2.6.6-1** of this EIS, Alternative D would employ approximately 473 workers on average per day during the construction phase, and 44 workers on average per day during the operation and maintenance phase. The increase in employment would not occur all at once but would fluctuate over the LOP. Other employment impacts discussed under the Proposed Action would apply to this alternative.

#### 4.16.1.4.3 Taxes and Revenue

Based on the assumption regarding net revenue per well in **Table 4.16.1.1.3-1** and a total of 5,058 wells proposed under this alternative, annual net local revenue would total a maximum of approximately $142.6 million to the combined Uintah County and Duchesne County economies. **Table 4.16.1.1.3-2** illustrates the maximum annual net local revenue per alternative.

Duchesne and Uintah Counties would also expect increased property tax revenues from existing levels as more oil and gas wells become productive. Alternative D would generate property tax revenues at a somewhat lower level than those under the Proposed Action due to the fewer number of wells developed.

#### 4.16.1.4.4 Quality of Living

The impacts of Alternative D on the quality of living in Duchesne and Uintah Counties - including impacts on public services, crime and housing – would be similar to those described under the Proposed Action. Alternative D would have slightly less quality of living impacts than those for the Proposed Action because fewer wells would be drilled and fewer people would likely be employed.

#### 4.16.1.5.5 Environmental Justice

***Air Quality***

The air quality setting for Alternative D is the same as that described under the Proposed Action. Alternative D would have slightly less air quality impact on EJ communities as would the Proposed Action.

***Land Use and Transportation***

At the peak of production, Alternative D would generate at most 1,517 trips per day within the MBPA (see **Table 4.12.1.1.2-1**), although actual trips generated would likely be lower. Traffic impacts on EJ communities under Alternative D would be similar to those described under the Proposed Action.

***Socioeconomics***

Socioeconomic impacts on EJ communities under Alternative D would be similar to those described under the Proposed Action. Alternative D would provide slightly less of a beneficial impact than the Proposed Action due to a fewer number of wells being developed.

### 4.16.2 Unavoidable Adverse Impacts

Given that natural resource development is finite and based on demand, the Uinta Basin is susceptible to a boom-and-bust cycle. While the proposed development would temporarily have positive impacts on the local economy, the depletion of the resource in the long term may result in an adverse impact to the economy. Those who had been dependent on the jobs and revenue associated with the project would be adversely impacted. Typically, the “bust” portion of the economic cycle adversely impacts nearly every sector of the economy, including employment/unemployment, housing, population, poverty rates, public finances, and infrastructure.

### 4.16.3 Irretrievable and Irreversible Commitments of Resources

The extraction of oil and gas would result in a permanent loss of natural resources. The irretrievable loss of oil and gas would preclude future revenues for local, state, and federal governments and the local communities. In addition, development and production of the energy resources located in the MBPA would require the investment of human, natural, and monetary resources. Most of those investments would be irretrievable and also may preclude or exclude opportunities associated with other alternatives.

### 4.16.4 Relationship of Short-Term Uses to Long-Term Productivity

Development and production of the energy resources located in the MBPA would provide economic support for local households. Communities would benefit from additional investments, and public entities would derive revenues from the economic activities. Development of these resources also would benefit residential, commercial, and industrial consumers outside the region. Some of the infrastructure put in place to serve this project also may support future production and distribution of energy resources from other deposits in the region or nearby area.

However, higher development and production rates in the short term carry with them potential trade-offs in social and economic conditions when compared to those that would exist over a longer time horizon, assuming lower more sustained development and production levels. **Section 4.16.3** discusses some of these trade-offs. Furthermore, the consumption of the energy resources in the short term would preclude its use at a future time. Which of these futures is preferable is largely a matter of individual preference.